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SPIRITUAL BEINGS IN WEST AFRICA—THEIR NUMBER, LOCALITY, AND CHARACTERISTICS.

BY

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The belief in spiritual beings opens an immense vista of the purely superstitious side of the theology of Bantu African religion.

All the air and the future is peopled with a large and indefinite company of these beings. The attitude of Creator—Anyambe—toward the human race and the lower animals being that of indifference or of positive severity in having allowed evils to exist and His indifference making Him almost inexorable, effort in the line of worship is, therefore, directed only to these spirits who, though they are all probably malevolent, are to be influenced and may be made benevolent.

I. ORIGIN.—The native thought in regard to the origin of the spirits is vague. Necessarily so. An unwritten belief that is not based upon revelation from a superior source, nor on an induction of actual experience and observation, but that is added to and varied by every individual's fancy, can be expressed in definite words only after inquiry among many as to their ideas on the subject. These, I find, coincide on a few lines; just as the consensus of opinion on any subject in any community will find itself running in certain channels, influenced by the utterances of the stronger or wiser leaders.

(1) It appears, therefore, that some of the spirits seem to have been conterminous with the life of Paia-Njambi in the Eternities. An eternity past, impossible as it is for any one to comprehend, is yet a thing thinkable even with the Bantu African, for he has words to express it: "peke-najome" (ever-and-beyond), "tamba-na-

ngama" (unknown-and-secret). Away back, in that unknown time, existed Paia-Njambi. Whence, or how, is not inquired by the natives; nor have I had any attempt even of a reply to my own inquiries. He simply existed. They are not sufficiently absurd to say that He created Himself. To do that he would need to antedate Himself. I have met none who thought sufficiently on the subject to worry their minds, as we, in our civilization, often do in effort to go back and back to the unthinkable point in time past, when God was not. Indeed so little is the native mind in the habit of any such research that I can readily perceive how their "We don't know" could easily be misunderstood by a foreign traveller, scientist or even missionary as a confession that "they did not know God." A statement which is true, but it is not the equivalent of or synonymous with that traveller's assertion that the native had no idea of a God. The native thought, wiser than ours, simply and unreasoningly says, "He is, He was." Conterminously with Him in origin there may have been some other spirits. This has been said to me by a very few persons with some hesitation. But if those spirits were indeed equal in existence with Njambi, they were in no respect equal to Him in character or power, and had no hand in the creating of other beings. In the Mpongwe tribe at Gaboon one winter Rev. J. L. Wilson, D.D., fifty years ago, thought the belief existed that, "Next to God in the government of the world are two Spirits, one of whom, Onyambe, is hateful and wicked. The people seldom speak of Onyambe, and always evince displeasure when the name is mentioned in their presence. His influence over the affairs of men, in their estimation, does not amount to much; and the probability is that they have no very definite notions about the real character of this Spirit." His character would be indicated by his name (O-nya-mbe (He) Who-is-bad). This name has sometimes been used by missionaries to translate our word "Devil." (Perhaps the idea of the word itself came from long-ago contact of this coast-tribe with foreigners.)

(2) A second and more recognized source of supply to the company of spirits is original creation by Njambi. While this origin is named by some I have not found it believed in to any very great extent. Even those whom I did not find believing it had very vague ideas as to the mode or object of their creation. Of the creation of mankind, and even of the Fall, almost all of the tribes have legends, more or less distinct, and with a modicum of truth, doubtless derived from traditions coinciding with the Mosaic history.

But of a previous creation of purely spiritual beings I have found no legend nor well-defined story. If such specially created spirits exist at all their relation to Njambi is of a very shadowy kind. They are, indeed, inferior to Njambi, and are in theory under his government in the same sense that human beings are. But Njambi, in his far-off indifference in actual practice, does not interfere with or control them or their actions. They are part of the motley inhabitants of "Njambi's Town," the place of the Great Unknown, as also are all the other living beasts and beings of creation. They also have their separate habitat, and pursue their own devices, generally malevolent, with the children of men.

(3) But the general consensus of opinion is that the world of spirits is peopled by the souls of dead human beings. This presupposes a belief in a future life, the existence of which in the native mind some travellers have doubted. I have never met that doubt from the native himself. While I do not impute to the travellers referred to any desire, in their efforts at describing the low grade of intelligence or religious belief of certain tribes, to misrepresent, I fully believe they were mistaken; their mistake arising from misunderstanding. It is not probable that they met, in the course of their few years, what I have not met with in a lifetime. It is probable that natives had expressed to them a doubt, or even ignorance, of a general resurrection, and may have said to them, as a few have said to me, "No, we do not live again. We are like goats and dogs and chickens. When we die that is the end of us." Such a statement is indeed a denial of the resurrection of the body; but it is not a denial of a continued existence of the soul in another life. The very people who made the above declaration to me preserved their family fetish, made sacrifices to the spirits of their ancestors, and appealed to them for aid in their family undertakings. The few who have expressed a belief in transmigration did not consider that the residence of a human spirit in the body of a beast was a permanent state; it was a temporary condition assumed by the spirit voluntarily for its own pleasure or convenience and terminable at its own will, precisely as human spirits, during their mortal life, are everywhere and by all believed capable of temporarily deserting their own human body and controlling the actions of a beast. This belief in transmigration, though not general, has been found among individuals in almost all tribes.

It being thus generally accepted that all departed human souls become spirits of that future that is all around us, there is still a

difference in the testimony of intelligent witnesses as to who and what or even how many of these souls are in one human being. Ordinarily, the native will say in effect, "I am one, and my soul is also myself. When I die it goes out somewhere else." Others will say, "I have two things—one is the thing that becomes a spirit when I die, the other is the spirit of the body and dies with it." [This "other" may be only a personification of what we specify as the animal life.] But it has frequently occurred that even intelligent natives, standing by me at the side of a dying person, have said to me, "He is dead." The patient was indeed unconscious, lying stiff, not seeing, speaking, eating, or apparently feeling; yet there was a slight heart-beat. I would point out to the relatives these evidences of life. But they said, "No, he is dead. His spirit is gone, he does not see nor hear nor feel. That slight movement is only the spirit of the body shaking itself. It is not a person. It is not our relative. He is dead." And they began to prepare the body for burial. A man actually came to me once asking me for medicine with which to kill or quiet the body-spirit of his mother, whose motions were troubling him by preventing the funeral arrangements. I was shocked at what I thought his attempt at matricide; but subsequently found that he really did believe that his mother was dead and her real soul was gone.

Such attempt to distinguish between soul-life and body-life has not infrequently led to premature burial. The supposed corpse has sometimes risen to consciousness on the way to the grave. A long-protracted sickness of some not very valuable member of the village has wearied the attendants; they decide that the body, though mumbling inarticulate words and aimlessly fingering with its arms, is no longer occupied by its personal-soul; that has emerged. "He is dead." And they proceed to bury him alive. Yet they deny that they have done so. They insist that he was not alive; only his body was "moving." Proof of premature burial has been found by discoveries connected with a certain custom performed when a village has been afflicted with various troubles after the death of one of its members. The village, after ineffectual efforts to drive away the evil influences that are supposed to cause these troubles, decide that the Spirit of some dead relative is dissatisfied about something, and order the grave to be opened and the bones rearranged, or even thrown into the river or sea. On opening the grave, corpses that have been buried in a recumbent position have been found in a sitting position. It is possible for one thus prematurely buried to change posture in a

dying struggle ; for mostly heathen graves are shallow (even among those who so dig graves at all), and are hastily and not always filled in.

Another set of witnesses will say that, besides the personal-soul and the soul of the body, there is a third entity in the human unit—namely, a dream-soul. That it is which leaves the body on occasions during sleep, and, wandering off, delights itself by visiting strange lands and strange scenes. On its return to the body, its union with the material blunts its perceptions, and the person in his efforts to remember or tell what he has seen relates only the vagaries of a dream. [A psychological view which, under the manipulation of a ready pen, could give play to fantasies, pretty, romantic and not unreasonable and not impossible.]

Some who are only dualists nevertheless believe in the wanderings of this so-called dream-soul, but say that it is the personal-soul itself that has gone out and has returned. Both dualists and trinitarians add that sometimes in its wanderings this could lose its way and cannot find its body, its material home. Should it never return, the person will sicken and die.

A fourth entity is vaguely spoken of by some as a component part of the human personality; by others as separate but closely associated from birth to death, and called the Life-Spirit. Some speak of it as a civilized person speaks of a guardian angel. Regarded in that light, it should not be considered as one of the several kinds of souls, but as one of the various classes of spirits (which will be discussed in a subsequent chapter). To it, worship is rendered by its possessor as to other spirits ; a worship, however, different from that which is performed for what are known and used as "Familiar Spirits." Others speak of the vague Life-Spirit as the "Heart." The organ of our anatomy which we designate by that name they call by a word which variously means "heart" or "feelings"; much like our old English "Bowels," the same word being employed equally to designate a physical organ and a mental state. Considering the organic heart as the seat (or a seat) of life, the natives believe that by witchcraft a person in health can be deprived of his Life-Soul or "Heart"; that he will then sicken ; that the wizard or witch feasts in his or her magic orgie on this "Heart"; and that the person will die if that heart is not returned to him.

II. NUMBER.—But what even this human soul may be, whether existing in unity, duality, trinity, or quadruplicity, all agree in

believing that it adds itself, on the death of the body, as another in the multitudinous company of the spirit-world. That world is all around us, and does not differ much in its wants and characteristics from this earthly life, except that it is free from some of the limitations to which material bodies are subject. In that spirit-world they eat the same food as when on earth, but only its essence, the visible substance, remains. They are possessed of all their passions, both bad and good. Men expect to have their wives with them in that future. [But I have never heard the idea even named, that there is procreation by spirits in that after-world.] Not having believed during this life in a system of reward and punishment, they have no belief in heaven or hell. All the dead go to Njambi's Town ; and live in that new life together, good and bad, as they lived together on earth. [The "Hell" spoken of by some of my informants, I believe, is not a native thought. It was probably engrafted on the coast tribes by the Portuguese Roman Catholic missionaries of three hundred years ago.]

If, therefore, the spirits consist entirely of the souls of departed human beings, how immense their number! Innumerable as are all the dead that have passed from this life in the ages gone by, excepting those who have gone permanently into the bodies of new human beings. That form of metempsychosis is believed in. Occasional instances of belief of transmigration into the body of a lower animal do not necessarily include the idea of a permanent residence there ; or that the departed soul has lost its personality of a human being and has become that of a beast.

But the idea of reappearance in the body of a newly-born child was formerly believed in, especially in regard to white people. Thirty years ago I wrote ("Crowned in Palmland," page 234): "Down the swift current of the Benita, as of other rivers on the coast, are swept floating islands of interlaced rushes, tangled vines and water lilies that, clinging to some projecting log from the marshy bank, had gathered the sand and mud of successive freshets and gave a precarious footing for the pandanus, whose wiry roots bound all in one compact mass. Then some flood had torn that mass away; and the pandanus still waving its long, bayonet-like leaves, convolvuli still climbing and blooming, and birds still nesting trustfully, the floating island glided past native eyes down the stream, out over the bar, and on toward the horizon of broad ocean. What beyond? Native superstition said that at the bottom of the 'Great Sea' was 'White Man's Land'; that thither some of their own departed friends found their happy future, exchanging a dusky

skin for a white one; that there white man's magic skill at will created the beads and cloth and endless wealth that came from that unknown land in ships, in whose masts and rigging and sails were recognized the transformed trees and vines and leaves of those floating islands. When on the 12th of July, 1866, a few with bated breath came to look on my little new-born Paul—the only white child most of the community had seen, and the first born in that region—the old people said, 'Now our hopes are dead. Dying we had hoped to become like you, but verily ye are born as we.'"

Not long after I had arrived at Corisco Island in 1861 I observed among the main people who came to see the new missionary one man who quietly and unobtrusively, but very steadily, was gazing at me. After awhile he mustered courage and addressed me: "Are you not my brother, my brother who died at such-a-time, and went to White Man's Land?" I was at that time new to the superstitions of the country; his meaning had to be explained to me. His thought of relationship was not an impossible one, for many of the Bantu negroes have somewhat Caucasian-like features. I have often seen men and women, at the sight of whom I was surprised, and I would remark to a fellow-missionary: "How much this person reminds me of So-and-So in the United States." This recognition of resemblance of features to white persons living in the United States was the third step in my acquaintance with native faces. At first all negro faces looked alike. Presently I learned differences; and when I had reached the third step I felt that my acquaintance with African features was complete.

III. Locality.—The locality of these spirits is not only vaguely in the surrounding air; they are also localized in prominent natural objects—caves, enormous rocks, hollow trees, dark forests, in this respect reminding one of classic fauns and dryads. While all have the ability to move from place to place, some especially belong to certain localities which are spoken of as having, as the case might be, "good" or "bad" spirits. It is possible for a human soul (as already mentioned in this chapter) to inhabit the body of a beast. A man whose plantation was being devastated by an elephant told me he did not dare to shoot it, because the spirit of his lately deceased father had passed into it. Also a common objuration of an obstreperous child or animal is "O na njemba" (Thou hast a witch).

Their habitats may be either natural or acquired. Natural ones are—for the spirits of the dead, in a very special sense—the villages

where they had dwelt during the lifetime of the body. But the presence of the spirits of the dead is not desired. It is one of the pitiable effects of superstition that its subjects look with fear and dread on what the denizens of civilization look with love and tender regret. We in our Christian civilization cling to the lifeless forms of our dead; and when necessity compels us to bury them from our sight we bid memory call up every lineament of face and tone of voice, and are pleased to think that sometimes they are near us. But it is a frequent native practice that on the occasion of a death, even while a portion of the family are wailing, and to all appearances passionately mourning the loss of their relative, others are firing guns, blowing trumpets, beating drums, shouting and yelling, in order to drive away from the village the recently disembodied spirit. On consideration it can be seen that these two diverse demonstrations are sincere, consistent, and, to the native, reasonable. With natural affection they mourn the absence of a tangible person who as a member of their family was helpful and even kind, while they fear the independent existence of the invisible thing, whose union with the physical body they fail to recognize as having been a factor in that helpfulness and kindness. This departed spirit, joining the company of other departed spirits, will indeed become an object of worship—a worship of principally a deprecatory nature; but its continued presence and immediate contact with its former routine is not desired. In Mashonaland the native "fears that death or accident may overtake him through the instrumentality of some fellow-being who may perchance hold against him a grudge. But a greater dread than this is of a visitation of evil by the spirit of a departed friend or relative whom he may have slighted while living."

A village in Nazareth Bay—the embouchure of one of the mouths of the Ogowe River—is called Abun-awiri (awiri, plural of ombwiri—a certain class of spirits; and abuna—abundance).

Large, prominent trees are inhabited by spirits. Many trees in the equatorial West Africa forest throw out from their trunks—at from ten to sixteen feet from the ground—solid buttresses continuous with the body of the tree itself, only a few inches in thickness, but in width at the base of the tree from four feet to six feet. These buttresses are projected toward several opposite points of the compass, as if to resist the force of sudden wind-storms. They are a very noticeable forest feature. They are very commonly seen in the silk-cotton trees. The recesses between them are actually

used as lairs by small wild animals; supposedly also a favorite home of the spirits.

Caverns and large rocks have their special spirit habitants. At Gaboon, and also on Corisco Island, geological breaks in the horizontal strata of rock were filled by narrow vertical strata of limestone, between which water-action has worn away the softer rock, leaving the limestone walls isolated, with a narrow ravine between them. These ravines were formerly reverenced as the abodes of spirits. When I made a tour in 1882, surveying for a second Ogowe Station, I came some seventy miles up river from my well-established first station, Kangwe, at Lambarene, to an enormous rock, a granite boulder, lying in the bed of the river. The adjacent hillsides on either bank of the river were almost impassable, being covered with boulders of all sizes, and a heavy forest growing in among, and even on, them. This great rock had evidently in the long past become detached by torrential streams that scored the mountain side in the heavy rainy season and had plunged to its present position. The swift river current swirled and dashed against the huge obstruction to navigation, making the ascent of the river at that point particularly difficult. Superstition suggested that the spirits of the rock did not wish boats or canoes to pass their abode. Nevertheless, necessities of trade compelled, and crews in passing made an ejaculatory prayer, but with the fear that the "ascent" in that part of the journey might be for "woe." Whence they called that rock Itala-ja-maguga; which, contracted to "Talaguga," I gave as the name of my new station, erected in 1892, in the vicinity of that rock. During my eight subsequent years at that station I did, indeed, meet with some "woe," but also much weal. And the missionary work of Talaguga, carried on since 1892 by the hands of the Société Evangelique de Paris, has met with signal success.

Capes, promontories, and other prominent points of land are favorite dwelling-places of the spirits. The Ogowe River, some 140 miles from its mouth, receives on its left bank a large affluent, the Ngunye, coming from the south. The low point of land at the junction of the two rivers was sacred. The riverine tribes themselves would pass it in canoes, respectfully removing their head coverings. But passage was forbidden to coast tribes and other foreigners. Portuguese slave traders might come that far; but, stopping there, they could do trade beyond only by hands of the local tribe. [Evidently superstition had been invoked to protect a trade monopoly.] A certain trader, Mr. R. B. N. Walker, agent for the English firm of Hatton & Cookson, headquarters at Libre-

ville, Gaboon, in extending his commercial interests, made an overland journey from the Gaboon River, emerging on the Ogowe, on its right bank, above that sacred point. Ranoke, Chief of the Inenga tribe, a few miles below, seized him, his porters, and his goods, and kept them prisoners for several months. Mr. Walker succeeded in bribing a native to carry a letter to the French Commandant at Libreville, who was pleased to send a gunboat to the rescue. Incidentally, it furnished a good opportunity to demonstrate France's somewhat shadowy claim to the Ogowe. After the rescue a company from the gunboat proceeded to the point and lunched there, thus effectually desecrating it. Mr. Walker made peace with his late captor, and established a trading station at the Inenga village —Lambarene. For years afterward natives still looked upon that point with respect. My own crew, in 1874, sometimes doffed their hats. But before I left the Ogowe, in 1891, a younger generation had grown up that was willing to camp and eat and sleep there with me on my boat journeys.

Graveyards, of course, are homes of spirits; and, of course, are much dreaded. The tribes, especially of the interior, differ as to burial customs. Some bury only their chiefs and other prominent men, casting away corpses of slaves or of the poor into the rivers, or out on the open ground, perhaps, covering them with a bundle of sticks. Even when graves are dug they are often very shallow. Some tribes fearlessly bury their dead actually under the clay floors of their own houses, or a few yards distant in the kitchen-garden adjoining their houses. But by most tribes who do bury at all there are chosen as cemeteries dark, tangled stretches of forest, along river banks, or ground that is apt to be inundated, or whose soil is not good for plantation purposes. I had often observed such stretches of forest along the river, and wondered why the people did not use them for cultivation, being conveniently near to some village, while they would go a much longer distance to make their plantations. The explanation was that these were graveyards. Such stretches would extend sometimes for a mile or two. Often my hungry meal hour on a journey happened to coincide with our passing of just such a piece of forest, and the crew would refuse to stop, keeping themselves and myself hungry till we could arrive at more open forest. Once after yielding to them, and rowing on for another hour, and the same hopelessly tangled graveyard still continued, I, famished, ordered the boat ashore. The crew obeyed unwillingly, and slowly they began to gather firewood with which to cook our luncheon. In pulling sticks from a convenient pile there

was revealed a skeleton. My hunger ceased, and I was willing to row on for another half-hour seeking for a proper camp. In eastern Africa it is believed that "the dead in their turn become spirits under the all-embracing name of Musimo. The Wanyamwezi hold their Musimo in great dread and veneration, as well as the house, hut, or place where their body has died. Every chief has near his hut a Musimo hut, in which the dead are supposed to dwell, and where sacrifices and offerings must be made. Meat and flour are deposited in the Musimo huts, and are not, as with many other people, consumed afterwards. The common people also have their Musimo huts; but they are smaller than that of the chief, and the offerings they make are, of course, not so important as his." (Dècle: "*Three Years in Savage Africa.*")

Beyond the regularly recognized habitats of the spirits that may be called "natural" to them, any other place or location may be acquired by them temporarily, for longer or shorter periods, under the power of the incantations of the native doctor (uganga). By his magic arts any spirit or spirits may be localized in any object whatever, however small or insignificant; and, while thus localized, are under the control of the doctor and subservient to the wishes of the possessor or wearer of the material object in which it or they are thus confined. This constitutes a "Fetish," which will be more fully discussed in another chapter.

IV. The character of these spirits is much the same as the human character they possessed before they were disembodied. They have most of the evil human passions, *e. g.*, anger and revenge, and, therefore, may be malevolent. But they possess also the good feelings of generosity and gratitude. They are, therefore, within reach of influence, and may be benevolent. Their possible malevolence is to be deprecated, their anger placated, their aid enlisted.

Illustration of malevolence in their character has already been seen in the dread connected with the ceremonies for the dead and at funerals. The similar dread of graveyards in our civilized countries may rest on the fear inspired by what is unknown, simply because it and they are unknown. But, to superstitious Africa, that unknown is a certainty, in that it is a source of evil; the spirit of the departed has all the capacity for evil it possessed while embodied, with this additional capacity, in that its exemption from some of the limitations of time and space increases its facilities for action. Being unseen, it can act at immensely greater advantage for accomplishing a given purpose. Natives dying have gone into

the other world retaining an acute memory of some wrong inflicted on them by fellow-villagers and have openly said, "From that other world I will come back and avenge myself on you!"

In any contest of a human being against these spirits of evil he knows always that whatever influence he may obtain over them by the doctor's magic aid, or whatever limitations may thus be put on them, they can never, as in the case of a human enemy, be killed. The spirits can never die.

Sometimes the word "dead" is used of a fetish-amulet that has been inhabited by a spirit conjured into it by a native doctor. The phrase does not mean that its spirit is actually dead, but that it has fled from inside of the fetish, and still lives elsewhere. Then the native doctor, to explain to his patient or client the inefficacy of the charm, says that the cause of the spirit's escape and flight is that the wearer has failed to observe all the directions which had been given, and the spirit was displeased. The "dead" amulet is, nevertheless, available for sale to the curio-hunting foreigner.

ON THE ORIGIN OF FIORDS.*

BY

GEO. D. HUBBARD.†

SECTION III.—Our present knowledge of fiords did not come all at once, but is the result of a steady accumulation of material relating to their features. Obviously, then, theories for the explanation of the origin of fiords show a development as well. The earlier explanations were based on the facts then known, and when further investigation revealed facts and relations formerly unknown the old theory became inadequate and a new one superseded it.

In the early study of fiord-form the fact of the great depth of the channel beneath the surface of the sea, coupled with the idea that rivers cannot cut channels much below sea-level, led to the supposition that the fiord channel was once a river valley of the land which had been submerged, allowing the sea to flow in for miles and drown it. Then, a more careful study of the channel floor, both beneath the fiord and up the channel, where the bottom is exposed, led to grave doubts as to the power of the river to cut a channel with such a floor. With this more detailed study came a theory supposing the fiord channel to be a "graben" or depression due to faulting and the dropping down of a block of rock. If faults are the cause of fiords they must be recent, because the fiords are in channels made since the last great uplift; channels which have been cut down below the erosion surface then uplifted, and now represented by the uplands. The fiords are so recent that their bare walls are scarcely weathered at all, and possess very little vegetation. Usually they are covered with scratches and grooves and have square shoulders, neither of which has yet been destroyed by disintegration. Faults in Norway are known to be ancient—much older than the last great uplift and the previous cycle of erosion which made the present upland surface. Again, if faults be the cause, they must accord with the drainage systems, because the fiords almost universally do. It is scarcely supposable that a system of faults whose origin is deep-seated should correspond with the watercourses of the surface topography. In Norway the faults do

* Continued from page 337.

† This paper was prepared as a thesis in geography under Prof. W. M. Davis, at Harvard University.

not agree with the drainage systems. These two objections to the theory of fiords by faults are just as strong in Scotland and Labrador as in Norway. Moreover, fiords are wanting in many other regions where faults occur abundantly; and fiords sometimes occur where faults are unknown. True, great faults occur in one arm of the Christiania fiord, Norway; but this arm is not so fiord-like as the other, where both walls are alike of hard gneiss.

Fiords have been thought to be specially dependent upon strong relief, upon high latitude and great snowfall. To these suggestions it has been answered that fiords do not occur in all regions having these characteristics; nor do all fiord regions possess these features. All fiords occur in regions recently glaciated, which may suggest a relation between glaciation and fiords. Direction of mountain ridges, with reference to coast-line, folding of strata, and rock texture and composition, has also been thought to furnish necessary conditions for the production of fiords. A reference to the following facts will show the weight to be attached to these elements. The rocks of the Norway fiord region are mostly Archean gneisses; of Sweden, Silurian strata overlying similar gneisses; of northwest Scotland, Archean schists. The western coast of Greenland is known to be Archean gneiss; while Disco Island is Cretaceous. Labrador and the southern part of Baffin's Land are Archean, but the northern part of the latter is Carboniferous. On the Pacific coast of North America the fiords occur in Mesozoic and Tertiary rocks. Penck* thus sums up his discussion: "Fiords occur in faulted rocks in Norway, Scotland, and Greenland, and in folded rocks in Patagonia, British Columbia, and New Zealand." Some occur in crystallines, some in sedimentaries; some where mountains are parallel to the coast, and some where they are transverse to it.

Another theory which has existed a good many years, and which has recently been gaining much more general acceptance, is that of glacial erosion by ice streams. Fiords were first ascribed to ice work in 1827 by Esmark; but the theory was considered absurd at that time, because the work was deemed too great for the agent. Later studies have led to the conclusion that ice-covered Greenland explains Norway; while exposed Norway explains Greenland. It has been pointed out by more than one observer that fiords are confined to regions recently glaciated. They are features of coasts in high latitudes, and are best developed in coasts of strong relief which have been at some time subjected to glacial conditions.

* Morph. der Erdoberfläche, 1894, II, 564.

A hasty glance at a little calculation, based on observations in regions of flowing stream ice, will help to elucidate the problem, and some comparative study will show the application of the glacial theory to it. In Muir Inlet, Alaska, the ice front of Muir glacier rises in a palisade two hundred feet above the water, and a short distance in front of the ice the water has a depth of seven hundred and twenty feet. If we calculate that a block of glacier ice floats in sea-water with one-sixth* of its volume above water, the two hundred feet of ice in view is more than enough to hold the seven hundred and twenty feet below water. On the supposition that the water does not shallow from the sounding to the ice front, the total thickness of the ice will be nine hundred and twenty feet, and the ice will rest on the bottom with a weight equal to a sheet of ice fifty-six feet thick, or about twenty-eight hundred pounds per square foot. If the water has shallowed towards the ice front the load on the bottom of the channel is greater. Russell† finds evidence that the ice has been much thicker here, and has extended farther seaward. He finds erratics on the flanks of bordering mountains two thousand feet above the present ice surface. The entire weight of this added thickness would be added to the calculated weight, and, with sea-level constant, would give a total pressure of over one hundred thousand pounds per square foot. Arm this ice with pebbles and boulders on its under surface and you have a rather formidable agent of erosion. After this glacier had cut a channel twenty-two hundred feet below the present sea-level it would still rest on the bottom with a weight of fourteen thousand pounds per square foot, and if still in motion would have considerable cutting power. If the land were somewhat depressed, that would prevent a part of the cutting calculated above, for it would allow the water to float up the ice; but if the land were at a higher stand the pressure would be greater and the power to erode would be increased. Probably at a sufficiently great pressure the ice in the lower layers would be softened or melted by pressure, and thus be unable to hold its tools.‡ Two questions arise,—(*a*) At what pressure would it melt?

* This proportion is taken because much glacier ice is not compact, and because sea-water, into which it extends, is saline—hence of greater density than fresh water. If it be thought that the true proportion should be 1:8 or 1:9, on account of greater assumed density for ice, or because of detrital material in the ice, that will make the first figures still more convincing.

† Glaciers of North America, 1897, 90.

‡ Experiments have demonstrated that a pressure of one atmosphere will lower the melting-point of ice 0.0135° F. Then 75 atmospheres, or about 158,000 pounds per square foot, would lower it one degree. This pressure, on the basis of the data used above, is equivalent to a thickness of 3,000 feet of ice.

This depends on its temperature, which is believed to be only a few degrees below the ordinary freezing-point. (*b*) If a change due to pressure occurs, would the ice become so fluid as to be unable to hold its tools, or would it simply become more plastic? If the temperature of the lower layers of ice be more than one or two degrees below the normal freezing-point, the second question need not concern us, because no such thickness of ice is required for the postulated ice erosion as would be necessary to fuse by pressure those layers at the bottom.

There are two processes to account for the uneven floor of the channels, both of which have probably played their part.

1. If the ice-tongue ran out to sea, nearly to the edge of the continental shelf, there would be formed a channel beneath the sea leading out as far as the ice-tongue had power to cut. This prolonged submarine channel is sometimes found. If the supply and waste maintained such a relation that the glacier could get no farther than the inner mouth of the fiord, obviously the channel would cease at that point. Since the glacier usually wastes and becomes smaller, the farther it flows from the supply, the end would be unable to cut as deeply as the portion a short distance inland, and would form a gently rising swell at the entrance to the channel. This, as pointed out in the description of Section I, is just what is found in the mouths of most fiords. A rapid recession, followed by a long stand at another point farther inland, would leave another sill deeper in the channel, with a basin between it and the former sill. Should the retreat and prolonged stand alternate, a series of swells and basins might be left all along the channel.

2. Again, if the ice encountered variations in the resisting power of the rock floor and walls, it would cut a depression in the weaker places, and leave transverse swells or sills in the stronger ones. On its final retreat, inequalities would remain the entire length of the channel, as so often observed in the landward portion beyond the head of the fiord. When a depression is started, the ice becomes thicker over it, because the upper surface of an ice stream tends to become rather uniformly graded. With increased thickness comes increased weight and decreased velocity. These changes may proceed until the ice ceases to move and erode in its lower layers. The scratches up the slopes of many deep basins, now exposed, indicate that the ice can pass, and has passed, out of them.

When a tributary glacier comes into the master ice stream the load on the bottom of the main channel is increased; consequently,

at the confluence of two fiord channels a deeper basin may be expected. Several such have been noticed by explorers. In a general way the broad part of a channel is shallower than the narrow part. For a similar reason the shallow side at a bend in the channel is on the inside.

According to Playfair's law, tributary streams of water enter the master stream by nicely-adjusted valleys, none of them too high or too low. Observation confirms the statement so far as the surface of the water in mature valleys is concerned, for at the mouth of the side stream the water surface of each is at the same level. But if the water be withdrawn from the channels it is equally evident that the bed of the smaller channel is somewhat above that of the larger one. This is necessarily so, because the little stream can only cut the channel deep enough to bring its own surface to the level maintained by the water of the master. Confluent streams, then, while having their surfaces and valley floors adjusted to the same level, will have discordant channel floors or beds. The amount of discordance will be an expression of the ratio of the volumes of the master and tributary streams, and a function of their respective drainage areas and run-off.

A glacier system in a mature state has its side streams entering the master stream, with their upper surfaces at accordant levels. If the master stream is a thousand feet thick, and the tributary has a thickness of two hundred feet, it is evident that the side stream cannot cut its channel deeper than two hundred feet below the common level of the uniting streams, while the master will have cut one thousand feet below the same level. It then appears that the floor of the side channel will be eight hundred feet above that of the trunk channel. A nice problem for study, and one pertinent to the subject of fiord origin, is to determine whether this discordance bears a definite relation to the drainage areas and to the precipitation on them, as seems to be the case with rivers. While the streams of ice, like water streams, seem, when flowing, to unite in nicely-adjusted channels, they are discovered to have been in discordant channels if the ice and water be removed. The discordance of channels, together with the usual evidence of glaciation —bare, scratched rock surfaces and erratics—is a very good demonstration that stream ice gave to the channels their present form and relation. The form of relief in fiords is that to be expected where ice streams have worked; and water is unable to produce such topography.

It has long been supposed that the only reason a fiord channel

contains sea-water is because of submergence of valleys carved in the land. Since ice can erode extensively below sea-level, we need postulate no depression to explain the present land and water relations in fiord regions. In fact, fiords cease to be evidence of submergence if they can be formed in some other way. Aside from the apparent drowning, the proof of submergence is very insufficient in fiord regions. Elevated beach-lines and sands are often found several hundred feet or less above the present shore-line, probably indicating a recent lower stand of the land. An elevation is more expectable since the retreat of the ice than a depression, because the quantity of ice, which all believe existed in these regions, would have a tendency to depress the land. Its melting and removal would have permitted the land to rise again. Owing to the great thickness of the ice, sinking, unless very great, would not remove the power of the ice streams to erode the channels. Beach-lines, now high above the present shore-line, may furnish evidence of emergence in recent times.

The cause of the failure by some to recognize fiords as results of ice work is twofold—first, we were unwilling to ascribe such enormous results to glacial erosion; second, we failed to comprehend thoroughly the relation of channel to valley in the case of both water and ice streams. Henry Gannett, of the United States Geologic Survey, furnished suggestive notes on this relation in 1898. It is stated by Davis.* After calling attention to the fact that in each case the channel is that part of the valley occupied by the moving stream, and that the water stream moving rapidly occupies but a very small part of its valley, while the ice stream, moving slowly, occupies a large part of its valley, he says: "A river has a channel with a broadly U-shaped cross-section at the bottom of its V-shaped valley, . . . and . . . a glacier has a V-shaped valley above its U-shaped channel." The fiord valley, so called, is in very large part an ice stream channel, but usually it spreads out above into a V-shaped valley. Believing the fiord to lie in a part of an old ice channel which may open out either into an ice valley or an old river valley, high up, where its walls flare more rapidly, the term "fiord channel" has been constantly used in the present article. This channel is not a valley in the sense that it was made by the stream or body of water that now occupies it. And, if made by an ice stream, the part in which the body of ice lay is not a valley, but is the channel of the ice stream.

The valley of an ice stream possesses parts analogous to those

*Glacial Erosion of the Ticino Valley, Appal., 1900, IX, 154.

of a river valley, and has them similarly disposed. The floor of the ice channel is uneven in a marked degree; this feature has its analogue, though less conspicuously displayed, in the depressions in the bed of a river which contain pools of water when the stream is so near dry that the water is no longer continuous. The floor or bed of a mature ice channel leading to the sea lies below sea-level at its mouth, provided, of course, that there have been no changes of sea-level since the forming of the channel. So the bed of a mature river, under the same conditions, is below sea-level at the mouth. In the case of the ice channel the depth is as great as the ice can erode it before the water floats the ice. The depth of the floor of the river channel at its mouth is a function of the width and discharge of the river. It will always be sufficient to bring the surface of the outflowing stream approximately to sea-level. The relation of channel floors, of uniting streams of ice, as well as that of uniting river beds, was discussed on a previous page and the similarity indicated. Another resemblance between glacier channels and river channels is found in seeking the line of greatest flow. Both ice streams and water streams have the greatest depth line coinciding with the greatest flow line. Where one departs from the median line, the other follows. Therefore, in the bends of fiord channels, the greatest depth is outside of the centre, as in river channels.

It remains yet to discuss the relation of the fiord channels to preglacial valleys. Since the land had been elevated previous to the ice invasion—as shown earlier in the discussion of faults—there must have been valleys of some form at the close of preglacial time. But since it is impossible to determine just what the topography was over which the ice first crept, the absolute amount of ice work in the channels is indeterminable. We know there were folding of strata and faulting before the ice appeared, and its work has been superposed on the topography it found. A measure of the minimum ice erosion can be obtained from the present altitude of the hanging valleys. If streams flowing in them prior to the beginning of ice work entered the streams in the master valleys at almost accordant levels—an expectable feature of streams—the master channel has been cut down by the ice the amount of its present depth below the side channel minus the slight discordance belonging to the earlier water channels. To this may be added any cutting known to have occurred in the side valley during its occupancy by ice.

In the light of the foregoing discussion of the theory of glacial

erosion* as the cause of fiords, it appears that the results of previous dynamic processes were not causal in the history of the fiord, but have helped, hindered, or directed the ice in its work, and thereby have given many varieties of form to fiords. The channels were not formed by faults, folds, stream-work, and so on, but were formed in spite of these earlier phenomena. The tendency of the ice was to produce the typical fiord, but where it could not it made the nearest approach to the type. The ice, working on old valleys and mountains, was helped in places, sometimes handicapped, and usually directed by the previous topography; and if unable to make the typical fiord, it made fiord-like forms, now known as fiärden, shären, föhrden, and other less marked geographic features. The dynamic processes, once brought forward as causes of fiords, naturally drop into their proper places. The climatic factors, high latitude and heavy precipitation of snow as conducive to glacial phenomena, may be called secondary or more remote causes of fiords.

A Few Selected References on Fiords.

Davis, W. M.
1882—Glacial Erosion. Proc. Bost. Soc. N. H., Vol. 22, pp. 19–58.
1900—Glacial Erosion in France, Switzerland, and Norway. Proc. Bost Soc. N. H., Vol. 29, pp. 273–322.

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Drygalski. 1893—Ein typisches Fjordthal.
Richthofen-Festschrift, pp. 41–54.

Mill, H. R. 1891—Clyde Sea Area.
Trans. Roy. Soc. Edinburgh, p. 641 ff.

Von Richthofen.
1886—Führer für Forschungsreisende.

* By glacial erosion the author includes all erosion accomplished by the ice, the tools held by the ice, and the streams beneath the ice charged with sediments.

A HANDBOOK ON MEXICO.

Mexico.—A Geographical Sketch, with Special Reference to Economic Conditions and Prospects of Future Development. Compiled by The Bureau of the American Republics. Washington, Government Printing Office, 1900.

It would be difficult to overestimate the benefits which the Bureau of the American Republics is conferring upon the trading and travelling community of the United States by the publication of such handbooks as the one under discussion at present. Our foreign trade development will naturally seek our sister republics of this hemisphere and the rich fund of information about the history, geography, antiquities, economics, governmental and industrial conditions, with the long and elaborate tables of statistics, cannot fail to prove of the very greatest value.

At the same time, however, the fact of the handbook being a compilation lays it open to the risk of error, both on account of the varying data and inaccurate nature of the original sources as well as mistakes in the translation of the Spanish and carelessness as to comparing what is written in one place with what is stated in another. For these reasons the mistakes found in all parts of the handbook constitute a very serious drawback to its usefulness.

Throughout it is rarely, if ever, that our doubts are put at rest as to whether the money cited is American gold or Mexican silver, nor as to what was the rate of exchange when the figures quoted were good. In the chapter devoted to the description of the States of the Republic, San Luis Potosi is omitted altogether. Among the many minor inaccuracies a cursory reading of the book reveals the following: From the list of bays worthy of mention (p. 8) Acapulco, probably the best natural [*i.e.* unimproved] harbour on the west coast is omitted altogether; on p. 10 the metals classified as *recently* found have in all probability been mined for over a hundred years; the statement as to the climate changing, p. 11, on account of the rapid destruction of the forests is open to grave doubt. It is a favourite subject for newspaper paragraphs; but it is doubtful whether the central tableland ever had forests to destroy. Others of the coast slopes are intact as yet; the close attention given by the Government to fish culture, p. 14, is a figment of the imagination; so far as we know the range to which Popocatepetl and Iztaccihuatl

belong, p. 55, is never called Sierra Nevada; the interpretation given to the name Tenochtitlan, p. 60, is wholly incorrect according to the best authorities; on p. 63, what is stated in regard to the railroads must come from a report 20 years old; the Central and the Interoceanic roads are omitted altogether, and, furthermore, the statements do not agree at all with Ch. XIV; the "Englishing" of the names of the railroads, p. 83, ought to be "Monterrey [with two r's] and Mexican Gulf"; Mexican Northern and Mexican National; the good wagon roads spoken of, p. 86 and p. 97, as existing between Colima and Mexico City and from Acapulco to the capital are imaginary, unless the roughest of mountain trails are to be called good wagon roads; the leprosy mentioned, p. 96, as common in the State of Guerrero, is probably a mild form of syphilide, common in all tropical lands; the International R.R., p. 101, does not touch the State of Mexico at all, but from Eagle Pass runs to Torreon; the Interoceanic has no track to Acapulco and probably never will have; in the railways of Michoacan, p. 104, no mention is made of the Michoacan and Pacific R.R.; the most important railroad of the State of Morelos, p. 106, the Mexico Cuernavaca and Pacific, is omitted; on p. 111 we should read Mexican Southern; the figures given, p. 153 *et seq.*, in regard to coffee culture are misleading, if understood as true of others than the most favourable localities; pulque is not a national drink but only of the tableland, p. 164, and, furthermore, it does not come from henequen; the statement, p. 220, as to the industrial awakening of Mexico coming from the depreciation of silver is doubted by many judicious observers; the surveillance of book entries, p. 221, by Government officials does not exist; the surveillance extends only to the investigation of whether each page has the stamp required by the Government law, or not; in Ch. XII no mention is made of the State and municipal taxes, which are excessive, and form a great drawback to the advance of the country; the Interoceanic road does not reach the Amacusac river, nor are there any stages for the principal towns in Guerrero; the State telephone lines of Guerrero, p. 294, are omitted; the settlement of Choctaw Indians near Zitácuaro, p. 312, does not exist, nor ever did; the papers mentioned, p. 316, as issued in the States are most of them occasional sheets, published in the interests of such-and-such a person for governor and devoted usually to bombastic eulogies of this candidate's many virtues, with bad poetry and insults and false charges made against the opposing candidate. Such sheets come out once a week and usually die in a few months; the missionary information, on p. 319, is not correct

in many particulars; in place of "white," p. 332, read "yellow" flag, and note that the rates quoted are in Mexican silver; adobe construction, p. 334, in the towns, except where it rains excessively, as in Jalapa, is universal, as is also the use of tiled roofs in place of azoteas, except in the towns of the tableland; the price of living, p. 346, is steadily advancing with the depreciation of silver.

The note on the pronunciation is a veritable curiosity of literature. Only foreigners new to the country pronounce the names as there indicated: Chihuahua is pronounced Chee-waw-waw, and not Chee-ooh-ah-ooh-ah; Coahuila is pronounced Coh-ah-weel-ah, and not Coh-ah-oo-eeh-lah; h in Mexican proper names is more guttural than the note would lead us to suppose.

The map at the end of the book is too old to be of any value. The railroads built in the last few years are not shown; San Cristobal ceased to be the capital of Chiapas in 1892, and Tuxtla Gutiérrez took its place. Tixtla has not been the capital of Guerrero since 1875, but Chilpancingo; there is no territory of Sierra Mojoda, while that of Tepic is wanting altogether.

In the printing of proper names there are many errors; Zumfanga should be Zumfango; Tuxla Gutierrez should be Tuxtla Gutierrez; Tlacotepec, p. 95, should be Tlacatepec; Tuxtla, p. 98, should be Tixtla; Pizcuaro, p. 105, should be Pitzcuaro; Tetecla (p. 167) should be Tetecala; Silas, p. 278, should be Silao, etc.

Considering, however, the difficulty of compilation, it must not be supposed that these errors detract from the helpful character of the book in aiding us to a better acquaintance with our neighbours of the Southern Republic.

Chilpancingo. GEORGE JOHNSON.

NOTES ON CLIMATOLOGY.

BY

ROBERT DE C. WARD.

THE CLIMATE OF THE HIGH PLAINS.—A recent report of considerable meteorological interest is likely to escape the notice of meteorologists because of its publication in the Annual Report of the United States Geological Survey. This is a mônograph on *The High Plains and their Utilization*, by Willard D. Johnson (21st Annual Report, U. S. Geol. Survey, Pt. IV, Hydrography, pp. 609–768). The High Plains correspond to what is sometimes called, for convenience, the Central Plains region. They lie in an irregular belt about midway across the long eastward slope of the Great Plains. The High Plains have practically no drainage, the local precipitation being disposed of by absorption. They are virtually unscored by erosion. Climatically, they lie in the Subhumid Belt. These High Plains were in the '80's the scene of an interesting but pathetic struggle on the part of man to occupy the land for agricultural purposes. Because of insufficient rainfall, failure followed these attempts, and the region was almost completely depopulated. Yet in spite of these discouraging pages in the recent history of the region, the High Plains are still an alluring body of unoccupied land, and will remain so until the best means for utilizing them have been devised. These lands are flat and fertile, and their annual rainfall at intervals is sufficiently heavy to make agriculture a paying investment of time and money. If farming is to be permanently profitable, however, experience has clearly shown that irrigation must be resorted to; and it is the purpose of Mr. Johnson's paper to show that, except to an insignificant extent, the High Plains cannot be irrigated so as to be reclaimable for general agricultural purposes, either from streams or from underground sources. Water is, however, obtainable from under ground in sufficient quantity to enable the entire area to be reclaimed for other uses than agricultural. This reclamation has already been begun, and it will be universally profitable. The problem is one of well-making, and of the proper location of wells, and then, by means of windmills, these Plains can be reclaimed from their present unprofitable condition and be successfully utilized as cattle ranges. This is to be the future of the High Plains.

The chapter of greatest interest from a climatic standpoint is the third, which deals with the *Deficiencies of Climate.* In this the reader will find an excellent presentation of the climatic characteristics of this interesting region. The climatic deficiencies of the High Plains as compared with the northwest are thus summed up: (1) The summer rains on the plains are violent and of brief duration, as a rule, rather than gentle and long-continued, as they commonly are to the north; (2) secular variation from the normal precipitation works greater harm; (3) the normal summer temperature is notably greater; (4) the relative humidity is notably less; (5) there are more hours of sunshine; (6) there is more wind, which, during the summer, is prevailingly from the south, is warm, and, therefore, has a drying effect, whereas during the same season in the northwest the prevailing winds are northerly; and (7) it is found that, as an effect of the brief ponding rains, the high temperature, the low relative humidity, the almost uninterrupted sunshine, and the persistent high winds, evaporation is greater in a marked degree. This chapter contains the best discussion of the climate of the general region in which the High Plains lie that has been published. The report as a whole, while largely geological and geographical in character, is full of interest to the climatologist, emphasizing as it does the control exercised by the climatic conditions of the Plains over the settlement of the region and the occupations of its inhabitants. There ought to be many more studies of this sort along the lines of human climatology and of human geography.

Forests, Snow, and Irrigation.—Increasing attention is being paid to the study of the amount of water available for irrigation purposes in those parts of our country where the rainfall is deficient, as, for example, in the High Plains region just alluded to. In connection with these irrigation problems a question of the greatest importance is the amount of snowfall on the mountains of the semi-arid region, and of the conditions of melting of this snow. In a recent paper on *Forests and Snow* (Bull. 55, Colo. Agric. Exper. Sta.), Professor L. G. Carpenter gives the results of an investigation made by him in the mountains of Colorado in the summer of 1900. The mountain streams in the early irrigation season are largely supplied by melting snow, and there is a marked diurnal fluctuation, which results from the daily variation in the rate of melting, and which disappears when the weather in the mountains is cloudy. It is interesting to note that the decrease in flow during the cloudiness, associated with continued rain, is so great that

it usually more than counterbalances the gain from the rain. A forest cover protects the snow, and the greater the amount of this cover the more uniform is the flow of the streams throughout the day and the season and the later the stream maintains its flow. Professor Carpenter concludes that the preservation of the forest is an absolute necessity for the interest of irrigated agriculture. The paper is illustrated by a number of half-tone plates, showing the forests with and without snow.

HANN'S LEHRBUCH DER METEOROLOGIE.—The newest text-book of meteorology, Hann's *Lehrbuch der Meteorologie*, (Leipzig, Tauchnitz, 1901, p. 805), is one of the most important meteorological publications of recent years. Since Schmid's classical *Lehrbuch der Meteorologie* of 1860 there has been no attempt to bring out so comprehensive a book as that of Dr. Hann. The new *Lehrbuch* is a treatise rather than a text-book. It is an admirable compact summary of the present state of our knowledge of meteorological science. The references are copious, well selected, and given with great accuracy and completeness. As a bibliography alone the *Lehrbuch* is a valuable publication. The book will prove indispensable to every one who wishes the latest and best authority on meteorology, and it is a fitting companion volume to the same author's *Handbuch der Klimatologie.* It is a pleasure to know that an English translation of the new book is already under way; for this is a volume that should be generally used by English-speaking meteorologists and climatologists, as well as by those who are non-professionally interested in meteorology.

THE CAUSE OF GLACIAL PERIODS.—The question as to the cause or causes of glacial periods is old, but ever new. Before the British Association at Glasgow, Mr. H. N. Dickson read a paper on *The Mean Temperature of the Atmosphere and the Causes of Glacial Periods*, in which attention was drawn to the fact that any change that may have occurred in the mean temperature of the atmosphere was probably accompanied by changes in the temperature gradient between equator and poles, and therefore by modifications of the atmospheric circulation. It was suggested that this had not been sufficiently taken into account in discussing glacial and other phenomena connected with secular changes of climate. The probable effects of changes in the general circulation of the atmosphere upon the distribution of precipitation, and especially upon the position and direction of the tracks of cyclones, were examined,

and Mr. Dickson suggested that the greater proportion of rainfall received with easterly winds on the polar sides of cyclones, in lower latitudes than at present, may explain some peculiar features of glacial phenomena. In any case, the writer believed that these aspects of the problem deserve more attention than they have received. They indicate that the variations of temperature required to account for climatic changes are of smaller range than has been supposed, and they may, by the exclusion of some surviving theories, assist in determining the true cause.

PHYSIOGRAPHIC NOTES.

BY

RALPH S. TARR.

THE RIVER SYSTEM OF CONNECTICUT.—In the Journal of Geology (Vol. IX, 1901, 469) Professor Hobbs presents a portion of his results obtained in work for the U. S. Geological Survey in the Connecticut region (see 21st Annual Report, U. S. Geological Survey, Part III, 1901, pp. 1–162). His theme in this article is to show the relation between stream course and the joint and fault planes. Hobbs points out that the tendency of the modern school of physiographers seems to be to ascribe little importance to geological structure planes as a factor in determining the position and the orientation of water-courses. He calls attention also to the fact that at an earlier period there was a tendency to assign marked importance to this possible cause of stream course. He calls particular attention to the fact that the Norwegian geologists, Kjerulf and Brögger, find a marked relationship between stream course and fault fissures. In describing the south Norway region, Brögger, for example, remarks that, as a final result of his observations in the region, he finds that almost every valley, every cleft, is formed along a fault fissure.

With this introduction, Hobbs proceeds to a consideration of the Connecticut region, which he has studied with especial care in the Pomperaug valley. It is a well-known fact that the Jura-Trias (Newark) strata of the eastern United States are complexly faulted, and that these faults extend into the underlying and surrounding metamorphics, in which, of course, it is much more difficult to trace the faults than in the areas of sedimentary strata. The detailed study which Hobbs has given to the Pomperaug valley

> has developed the fact that a complex system made up of intersecting series of parallel, nearly vertical, joints and faults there divides the crust into a large number of orographic blocks, the smaller of which have dimensions of less than one hundred paces.

He further remarks:

> It was found in studying the area that the streams, large and small, for considerable distances adhere with great fidelity to the directions of some of the prevailing faults, and that in many cases, after being diverted from them, it was noted that they had returned persistently to the old direction. This correspondence of drainage lines to geological structure planes is far too close to be accidental.

Extending the study beyond the limited area, which he has examined carefully, Hobbs has traced maps of the Connecticut drainage from the United States Geological Survey charts, and upon them marked a theoretical extension of the fault planes observed in the Pomperaug area. These maps certainly develop a striking orientation of the streams in coincidence with the theoretical direction of the faulted areas. But the weak points in the paper are the failure to consider other explanations, such as superimposition, and the extremely hypothetical nature of the evidence outside of the Pomperaug valley.

The peculiarities of the drainage of southern Connecticut have long been a puzzle to physiographers, but Hobbs's study furnishes us a possible explanation of this peculiar drainage. His hypothesis is well worthy the careful consideration of physiographers; and if further detailed study of crystalline rocks of Connecticut reveal as close parallelism between stream course and structure planes as seems to be the case in the Pomperaug valley area, it will introduce to physiographers an element which many of the American school have been quite apt to consider unimportant. The lesson supplied by the Far West and elsewhere has tended to lead us to believe that fault plains have had very slight influence on stream course; and it will require very complete evidence to offset this view. Abundance of joint planes, on the other hand, are known in a number of cases to have had an influence on the direction of stream course. Is it not perhaps the influence of joint planes rather than of faulting that accounts for the phenomena to which Hobbs has called attention?

Recent Papers by Professor Davis.—In a paper read before the 7th International Geographical Congress in 1899 (Sonderabdruck aus den Verhandlungen des VII Internationalen Geographen-Kongresses in Berlin, 1899, pp. 221–231) Professor Davis makes a clear statement of his views upon the geographical cycle, which are so well known to American students. One of the important points which he makes in this paper is that geographers, in their studies which accompany travel, should add to mere description an appreciation of the scientific aspects of geography. This point he states in the following words:

> Geographers have been too long content to work without the aid of the faculties of imagination, invention, deduction, and verification, whose exercise has been found so highly advantageous to the progress of other sciences. If the adoption of the scheme of the geographical cycle will lead the geographer to think more it will certainly not cause him to see less. Owing to a too great reliance on observation alone,

geographers have left to their allies, the geologists and the biologists, who are more skilled in methods of scientific investigation, the discovery of the two most important general principles that are to-day involved in geographical study ; one being the evolution of land-forms and the other the devolution of organic forms. Is it not, then, now incumbent, on geographers at least, to make active application of these principles and of the methods by which they were discovered ?

As a fair example of the kind of discussion which the foregoing paper proposes, reference may be made to Professor Davis's own paper describing an excursion in Bosnia, Herzegovina, and Dalmatia (Bulletin Geographical Society of Philadelphia, Vol. III, No. 2, Feb., 1901). This paper is a popular description of an experience which Professor Davis had in 1897 on an excursion with Professor Penck of the University of Vienna. It is as interesting as most accounts of travel, though lacking the grotesque features which so often mar such attempts at scientific description. Yet, notwithstanding its interesting and popular nature, the paper is full of valuable information and deduction from scientific observations.

Another illustration of Professor Davis's method—far less popular, however, but of its kind a perfect illustration—is his recent paper describing An Excursion to the Grand Canyon of the Colorado (Bull. Museum Comparative Zoölogy, Vol. XXXVIII, 1901, pp. 107–201). It is difficult to summarize Professor Davis's careful analysis; but, in general, it may be said that he agrees in the main with the conclusions of earlier workers, though differing from them in his interpretation of some of the minor details. He also finds from his study that some of the interpretations of observed fact are not necessary. One important result of his study is his statement of the evidence indicating that the Colorado is not in any marked degree an antecedent river, but rather one of consequent origin. In this connection he says:

> The Colorado itself may be in part antecedent to some of the many dislocations that the district has suffered, but it seems to be for the most part consequent on the displacements caused by faulting in the later part of the great denudation, and on the form that the surface had assumed at that time.

Professor Davis notes the bearing of certain facts in the Colorado Cañon on the question of glacial erosion. He and others have held that side valleys, tributary to a main stream, and entering at a higher level, are in the case of the Alps, Norway, and some other regions indication of glacial erosion. These high-level tributary valleys have been given the name of *hanging valleys*. Some students of the subject have held that these hanging valleys are the normal result of the more rapid deepening of the main valley by the larger stream, thus leaving the tributary valleys behind in the work of

erosion, so that their bottoms are now high above the bed of the main stream. Professor Davis pointedly says that if this view is correct,

> then, surely, the discordance of side and main valleys ought to be very strong in the Grand Canyon, where there is no question of glacial erosion, where the disparity of volume between trunk river and side streams is notoriously great, and where the main valley is still so young that no significant widening of its floor has been yet accomplished. Yet, singularly enough, the side canyons of the Colorado join the main canyon at accordant levels in nearly all cases.

We have come to expect from Professor Davis the introduction of new geographical names and descriptive terms in his publications, and in the paper under consideration this expectation is not disappointed. While most of his terms are sound and descriptive, it seems to some physiographers rather questionable whether new names are not multiplying with altogether too great rapidity. Already the time has come when no one but a trained physiographer can read the literature intelligently. There is actual need of a glossary of physiographic terms. The introduction of this great mass of names must tend to interfere with the very object which Professor Davis has in his appeal to geographers to adopt more scientific methods, for it is plainly evident that without an extensive reading of the whole literature the new physiography, with its varied terms, is almost inaccessible to the geographer. No one will question the desirability of introducing a new term when one is actually demanded, but to introduce them in advance of such a need, as Professor Davis has done in his diagram on page 193, really seems uncalled for and of questionable value. Even a trained physiographer, unless he has a strong leaning toward classification, must recoil from the task of learning the proper use of the following names, which are marked in Professor Davis's diagram, fig. 17, page 193: Splitting ravine, peak-headed ravine, saddle-headed ravine, ridge-headed ravine, left basal ravine, right basal ravine, right side ravine, forking valley, split spur, tapering spur, terminal spurlet, right side spurlet, right basal spurlet, sprawling spur, left basal spurlet, mid-basal spurlet.

Origin of Structure of Basin Ranges.—According to Gilbert, Russell, and others, the Basin Ranges owe their peculiar forms in large part to faulting; but some workers, notably Dana, have dissented from this view, which is based largely upon physiographic evidence. Spurr (Bull. Geol. Soc. Amer., Vol. XII, 1901, pp. 217–279), basing his conclusions on a study of the literature and of parts of the field, strongly dissents from the common interpretation of

faulting, for he does not see in the physiography of the region sufficient proof that the form is to be ascribed to this origin. Instead of persistent monoclinal ridges he finds that the mountains almost invariably merge into folds. Faults that are ascertainable, according to his views—that is, faults in this region that are proved by stratigraphic evidence—are not, in general, associated with mountain fronts. In fact, where faults are present near the mountain front they are rarely attended by fault scarps, but, on the contrary, the steep mountain faces appear to be due to erosion. From his studies he considers the features of the Basin Ranges to be natural and normal results of erosion of the folded rocks. Their present form is the result of denudation, which has been in operation since Jurassic time. The older faults of the region are obscured by erosion, and new ones only are expressed in the topography.

The question which Spurr thus raises is most interesting, and worthy of careful future study. It is evident from what he has to say that the work of previous observers in this region has not been published in sufficient detail to support the broad conclusions which have been drawn from it with force enough to convince the writer of the paper. The reconnaissance nature of the work done in this field may, perhaps, account for this difficulty. It seems fairly certain, however, that there has not been a sufficiently critical study of the physiographic evidence to warrant the acceptance of faulting as an established explanation. But further than this it seems impossible to go; for, as Professor Davis has clearly and vigorously stated in his review of Spurr's paper (Science, Vol. XIV, 1901, p. 457), Spurr, on the other hand, has equally failed to establish his own thesis, because he has failed to discuss critically, and disprove the evidence of, a physiographic nature which previous observers have put forth. In fact, he does not appear to have a proper appreciation of the independent value of physiographic evidence, since faults inferred by such evidence are not considered by him as having proper foundation. There ought, in America, to be no question at this time concerning the value of purely physiographic evidence. Doubtless in the enthusiasm for this youngest branch of geology its votaries have in some cases made it carry too heavy a burden; but these are merely mistakes of individuals. The principles of physiography itself have become so well established that when a discussion is undertaken in which some of the facts are in the nature of physiographic evidence, it has come to be necessary to consider them as carefully as if they were stratigraphic or petrographic evidence. It is in his failure to recognize this fact that

Spurr's paper is weak; and it is because of this weakness that his conclusions cannot be accepted as proved. They may be correct, but further consideration of the physiographic evidence is necessary before his contention can be considered established.

LANDSLIPS IN NORWAY.—Reusch (Norges Geologiske Undersögelse, No. 32, *Aarbog* for 1900) describes some interesting landslips which occurred in Norway some years ago. In the Vaerdal landslip of May, 1893, in which fully 55,000,000 cubic metres slid into the valley of a small stream, the stream had been cutting against a clay bank in which there was "quick" clay beneath the soil. The action of the stream in lateral erosion caused numerous small slides, and the movement culminated at midnight on the 19th of May with the great slide, which killed 111 people and dammed up the stream, forming a lake with an area of three square kilometres. In the same vicinity a great landslide occurred three years before.

Farther up stream, in the same year, there occurred a peculiar change in the river. At one point the stream was flowing in a cut over rock at the base of which it turned sharply at right angles, cutting against a bluff of marine clay, which separated the lower course of the river from the upper course above the rock barrier. By cutting and weathering, the clay barrier between the two sections of the stream was so lowered and narrowed that there was evident danger of the stream taking that channel and abandoning its rock valley. In consequence of this danger it was proposed to strengthen the clay barrier; but before anything was done, during a time of flood, the water in the upper course of the river spilled over the clay divide, at first as a tiny stream, then, in the course of an hour, as a roaring, muddy torrent, which quickly cut so deep into the clay that the rock section of the valley was abandoned. This, of course, lowered the grade of the stream, which had previously been held back by the rocky barrier, and the river began rapidly to deepen its valley up stream, and, at the same time, the side streams near their mouths began to cut narrow gorges in the clay beds. The result was that in a short time the old broad-bottomed valley was transformed to a cañon, and the side valleys became young in form. By pictures and a series of drawings Reusch illustrates the development of the cañon condition up stream; and one picture shows strikingly what a tremendous change took place where, in order to pass from one side of the valley to the other, instead of going by even grade as formerly, it had become necessary to travel across from

one side of the old flood-plain to the other in a cage suspended from wire ropes. With this rejuvenation of the stream valley, owing to the steep slopes, numerous landslides naturally occurred as the clay slipped, and by this means farms were destroyed and roads ruined. Reusch points out that this case well illustrates, on a small and rapid scale, what would happen in the elevation and consequent rejuvenation of a stream system upon a coastal plain.

Some Topographic Features of Norway.—In the same *Aarbog*, in which the above account of landslides is given, is an interesting interpretation of the topography of portions of Norway. There is much detailed description of individual fjords, valleys, and falls, accompanied with interpretation of their origin and illustrated by numerous clearly-made sketches. The high plateaux are interpreted as peneplains, not being due to marine denudation, as is the case in some of the lower coastal plains, such, for example, as that near Bergen.

Of the many sounds, inlets, etc., near Bergen, some are due to the action of the sea, and many of them owe their position to structure and joint planes. In accounting for the fjords, Reusch agrees in part with Professor Davis, that the hanging valleys which enter on the side, at levels well above the fjord bottom, and even, in some cases, fully half a mile above the present sea-level, are an indication of glacial erosion; but he states that he cannot agree that the fjords have been entirely formed by glacial erosion. Norway was once apparently higher than at present, and water action must be in part invoked to account for the phenomena. Some fjords show signs of complex origin, in which interglacial water erosion and several periods of glacial erosion are involved. The glaciers, in moving down these valleys, not merely enlarged them but also partly destroyed the side valleys by wearing back the sides of the main fjord valley.

Owing to the rather full English summary that is in the back part of the volume, these physiographic and geological articles are rendered accessible to English-speaking students.

The Andes of Patagonia.—Partly due to the attempted settlement of the boundary dispute between Chile and Argentina, the literature on the hitherto little-known Patagonia has of late been decidedly increased. One of the latest accounts of importance is by Gallois (Les Andes de Patagonie, Annales de Géographie, tome X, 1901). The article contains much interesting description of

surface features, and is illustrated by a series of splendid panoramas, in which are shown the grander features of topography—the rugged mountains, with their waste slopes and extensive snow fields and glaciers. It is also illustrated by a new map (1901, by Moreno), on which is shown the western boundary of Argentina. Upon this map the topography is shown by shading in such a way as to bring out clearly the rugged mountain chain to the west and the broad level plains of the east. It shows with marked clearness, also, the contrast between the regular eastern coast and the deeply-fjorded west coast.

A new series of maps, published in London, on Argentine evidence in the Argentine-Chilian boundary dispute, has just appeared. They portray, in a very clear manner, some of the larger features of the physiography of Argentina.

NIAGARA FALLS.—Notwithstanding the already extensive literature devoted to Niagara Falls, the recent paper by Grabau (Bull. N. Y. State Museum, No. 45, Vol. 9, 1901) is a distinct addition, which will be greatly welcomed by large numbers of people. It is prepared

> with the special purpose of affording to visitors to Buffalo during the season of the Pan-American Exposition in 1901 a viaticum in their tours through this region, renowned for its scenic features and classic in its geology.

Owing to the object with which it is prepared, this paper is naturally a summary of our knowledge of the Niagara Falls region, gained as the result of the labours of large numbers of investigators. It is, however, more than this, for from a number of points Grabau introduces new ideas concerning the interpretation of the physiography of the region, as, for example, in his interpretation of the early drainage. His long acquaintance with the region has fitted him admirably for the task which he has undertaken. It happens that most workers in this region have looked at the Niagara problem from its physiographic standpoint, with the result that there is scarcely anything that is full and complete on the details of the stratigraphic aspect. It is in this direction that Grabau's paper is especially strong, and his description, with figures of the fossils of the Niagara gorge, will be found of great use to those who go to study in this region. One of the unique and extremely valuable portions of the report is Chapter V, by Miss Letson, upon the post-pliocene fossils of the Niagara River gravels. There is also a fairly complete bibliography of the Niagara geological literature.

THE ADIRONDACKS.—In a recent number of Appalachia (Vol. IX, 1899) Smyth has stated the main facts in the history of the Adirondack region. In the complex of rocks of this mountain group some are evidently altered sediments, others granites, syenites, gabbros, etc., of plutonic origin, greatly altered by metamorphism since their intrusion. Thus a gneissic banding has been introduced even in the igneous members of the series. Following the intrusion of the great bosses of plutonic rocks were apparently two periods of minor igneous activity—one pre-Cambrian, the other post-Ordovician. After the pre-Cambrian intrusion of dikes

constructive action in the Adirondacks ceased for a long time. A period of profound erosion followed, laying bare the rocks which had been formed or metamorphosed, or both, as the case might be, at great depths in the earth's crust.

Concerning the condition of the Adirondacks in Cambrian time Smyth puts forward two hypotheses, from which he does not feel that the facts yet warrant a selection of either one as demonstrated. On the one hand it is possible that

during upper-Cambrian time the Adirondack region formed a rugged island, rather smaller than the present area of crystalline rocks, and with a very irregular coastline. On the other hand, it is also possible that the region was reduced to low relief by pre-Cambrian denudation, and that the Potsdam outliers have been faulted into their present position.

PEARY'S PROGRESS TO THE POLE.

A LECTURE BEFORE THE SOCIETY ON TUESDAY EVENING, NOV. 19, AT MENDELSSOHN HALL, BY HERBERT L. BRIDGMAN, SECRETARY OF THE PEARY ARCTIC CLUB AND IN COMMAND OF THE *Diana*, 1899, AND *Erik*, 1901, EXPEDITIONS. THE LECTURE WAS FULLY ILLUSTRATED BY STEREOPTICON VIEWS FROM NEW PHOTOGRAPHS, AND THE FOLLOWING IS A SUMMARY OF ITS MORE IMPORTANT FEATURES:

The rôle which falls to me this evening, ladies and gentlemen, is very simple and very old. Indeed, were I in a church, I might imitate the preacher and say, "You will find my text in such a chapter and verse," but, perhaps, as you may, like myself, be a little out of practice, I may make myself more easily understood by simply saying that I am a sort of herald come out of the North, forerunner of a man who, having already high honours and distinctions, will come, next year, to us deserving still greater praise, and bringing the great geographical prize of the centuries.

The situation, at the time of the departure of the *Erik*, on the 14th of last July, was, briefly, that two years, or, rather, two full seasons for Arctic work, had elapsed since anything had been heard from Lieut. Peary, and that an entire year had passed since the *Windward*, with Mrs. Peary and Miss Peary on board, sailed for the North, with the incidental knowledge that two years had also passed since any word had been heard from Sverdrup's Norwegian *Fram*. What had been the fate of these three expeditions? Whether all had gone well, or whether disaster had overtaken either, it was our business, if possible, to go and find out. Our destination, by common understanding, was Etah, Peary's North Greenland headquarters, where we of the *Diana* bade him farewell on that gray August morning in 1899, when we came down Foulke Fjord with flags flying and red lights burning, while the explorer and his little band of native allies from the rocks answered our cheers.

Leaving Sydney, the *Erik* dropped anchor next day at Port-au-Basque, Newfoundland, where, after three days' delay, our complement of men from St. Johns was obtained, and putting immediately to sea, we rounded Cape Ray Light at midnight of July 17. One fine day and another of head-winds brought us in the Straits of Belle Isle into the ice, much more to the south than any Arctic

ship since Peary's first *Kite*, in 1891, had met it, cutting off completely our hope of a Labrador port, and driving us far out to the eastward toward the middle of Davis Strait. Here we encountered the East Greenland stream, coming around Cape Farewell, driving us again to the north, so that with the worst of weather all the time we finally dropped anchor late on Saturday evening, July 29, in the little harbour of Disko Fjord.

The next morning being fine, we retraced our course to Godhavn, where Governor Nilsen informed us that they had no news of either Peary's or Sverdrup's ship, but that in March a steamer heading north had been seen far out in Davis Strait—which we all agreed might possibly have been the missing *Fram*. Remaining less than twenty-four hours in Godhavn, we were under way early on Monday, arriving on Wednesday at Upernavik, where Inspector Jansen and Governor Knauth greeted us, with no more information of Peary, and pushing at once into the ice of Melville Bay, after three days we woke, at midnight of Friday, August 2, with blasts of our whistle, the native settlement at Cape York. Taking on board a party of natives, we proceeded through the open north water, and at 6 o'clock on the evening of Sunday, August 4, had the satisfaction of dropping anchor alongside of the *Windward* in Foulke Fjord, under the rocky cliffs of Etah.

We found on the *Windward* the Peary family, Surgeon Dedrick, and Capt. Bartlett, with all the ship's company, all in perfect health and with an exceedingly interesting story of the experiences since they had been heard from. Lieut. Peary delivered in person the telegram and letters, of which copies follow, left by him with Surgeon Dedrick at Fort Conger in April last upon his departure for the North, with the expectation that the Doctor would bring them South and deliver them before Peary should return.

The telegram, published for the first time, is as follows:

U. S. Consul—Kindly cable immediately

PEARY.

CONGER, April 4, 1901.

BRIDGMAN,
Standard Union,
New York.

May, 1900, rounded north end Greenland 83 degrees 39 minutes. Down east coast to 83 degrees. North to 83 degrees 50 minutes. Stopped by broken pack. Wintered Conger. No news ship. Now starting North via Cape Hecla, Henson, one Eskimo. Doctor Dedrick remainder party going south find ship. All well. Letter.

PEARY.

* The letter to the secretary of the club read:

CONGER, April 4, 1901.

MY DEAR BRIDGMAN:

It gives me great pleasure to present to the Club the results of the work of 1900.

First—The rounding of the northern limit of the Greenland Archipelago, the most northerly known land in the world, probably the most northerly land.

Second—The highest latitude yet attained in the Western Hemisphere (83 degrees 50 north).

Third—The determination of the origin of the so-called paleocrystic ice (floe berg), etc., etc.

Considering that I am an old man, have one broken leg and only three toes, and that my starting point was Etah, I feel that this was doing tolerably well. It is almost 1,000 years since Eric the Red first sighted the southern extremity of the archipelago, and from that time Norwegians, Dutch, Danes, Swedes, Englishmen, Scotchmen and Americans have crept gradually northward up its shores until at last, through the instrumentality and liberality of the Club, its northern cape has been lifted out of the Arctic mists, and obscurity. It seems fitting that this event, characterized by Sir Clements Markham as second in importance only to the attainment of the Pole itself, should fall in the closing year of the century. If I do not capture the Pole itself in this spring campaign I shall try it again next spring.

My gratitude and respects to all the members of the Club. Always most sincerely,

PEARY.

The fuller report to the Club of the work of the expedition was in these words:

CONGER, April 4, 1901.

DEAR SIR:

After sending back the two natives from C. Britannia (C. North) May 4, 1900, I continued north along the Greenland coast with Henson and one Eskimo.

Lockwood's Farthest was reached May 8, and his record taken for the archives of the Club.

Cape Washington was reached on the next march, and the northern extremity of the Greenland archipelago, May 13, N. lat. 83:39 W. long. 33:20.

No land visible northward, but a water sky in the distance, as over a broad lead or pool.

From here proceeded due North to N. lat. 83:50, where I was stopped by disintegrated pack. Water sky not far distant.

Returning to north point of land proceeded eastward and southeastward down the east coast to 83 N. lat. (approx.) W. long. 25 (approx.). Stopped here by dense fog and severe storm. Fog continued for ten days.

Returning, Conger was reached June 10. Open water at Black Cape, Black Horn Cliffs, Cape Brevoort and Cape Sumner rendered our progress at times precarious.

Cairns and records were left in the highest known land in the globe, at the farthest known land on the east coast, and at Cape Washington.

Ten musk-oxen, one bear, one hare, were killed near the extreme northern point of the land. Thirty-two other musk-oxen, one wolf, several seals, two fresh bear tracks, and numerous ptarmigan were seen during the journey.

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* Printed in BULLETIN No. 4, pp. 366–7.

So-called paleocrystic ice, floe-bergs, etc., were observed in process of formation along the north coast.

During my absence Dr. Dedrick and the Eskimos had secured some thirty-three musk-oxen and ten seals in the vicinity of Conger; had established small caches for my return at Thank-God Harbor, Cape Lieber and Lincoln Bay, and had brought up sugar, milk and tea from the various caches between Conger and Cape Louis Napoleon.

July was passed by Dr. Dedrick with a portion of the Eskimos in the region from Discovery Harbor westward, via Black Rock Vale to Lake Hazen, where he secured over forty musk-oxen.

During August and early in September various other hunting trips of shorter duration were made, resulting in the killing of some twenty musk-oxen.

The middle of September I started with a party for Lake Hazen region to secure musk-oxen for our winter supply, it being evident that no ship would reach us. Going west as far as the valley of the Very River by Oct. 4, ninety-two musk-oxen had been killed. Later nine more were secured, making a total of 101 for the autumn hunting.

From the beginning of November to March 6 a large portion of the time was passed by the party in igloos built in the vicinity of the game killed in various localities from Discovery Harbor to Ruggles River.

In February Dr. Dedrick, starting on his way to the meat at Very River, was successful in killing nineteen musk-oxen at Ruggles River, rendering it unnecessary for him to go to Very River.

One of the Eskimo women died Jan. 13, and Henson showed symptoms of scurvy at the same time.

On the reassembling of the entire party at Conger March 6 (Dr. Dedrick had been living in the igloos since Jan. 2) the doctor pronounced every one showing symptoms of anæmia. This delayed my departure, which I had hoped would take place March 15.

March 19 I started for Ruggles River, returning to Conger March 22, with meat. March 25 Dr. Dedrick left to hunt musk-oxen in the vicinity of C. Beechy and Wrangle B., for use of my northern party. He returned April 1, having seen tracks only of the animals.

I start to-morrow with Henson and one Eskimo and twenty-four dogs for C. Hecla, or some favorable point in that neighborhood, from which I shall attempt to push north over the polar pack as far as possible. Dr. Dedrick at the same time starts south with the rest of the party to communicate with the ship.

On my return to Conger from the north I expect to follow him south, join the ship, and make every effort to push her as far north as practicable the coming summer. If disaster has overtaken the ship in her efforts to get north last season, I expect from D'Urville and Sabine as a base to devote my time next fall to work on the west side of Grinnell land, and it is quite possible that I may go north next spring along the west shore of that land on a route parallel to the now well-beaten Smith Sound group.

In continuation of my letter to you from Conger April 5 I note as follows:

April 5 I left Conger with Henson, one Eskimo, two sledges and twelve dogs for my northern trip. On reaching Lincoln Bay it was evident to me that the condition of men and dogs was such as to negative the possibility of reaching the Pole, and I reluctantly turned back.

Arriving at Conger, after an absence of eight days, I found the doctor and his party there. Leaving Conger the same time as I with six Eskimos, two sledges and

seven dogs and pups, in an attempt to communicate with or obtain news of the ship, the character of the traveling had obliged him to return before reaching Cape Lieber.

Fortunately the night before I arrived one of the Eskimos secured several musk-oxen above St. Patrick's Bay, which enabled me to feed my dogs before starting south, which I did with the entire party on the 17th.

April 30 at Hayes Point, I met the party from the *Windward* attempting to reach Conger, and received my mail, learning that the *Windward* was at Payer Harbor. After a rest at the D'Urville box house, I went on to the *Windward*, arriving May 6.

Dr. Dedrick remained at D'Urville with the dogs and two of the men from the *Windward* to transport supplies up the coast for the next winter's campaign.

After nine days' rest at the ship Henson started with five sledges to get the pemmican to Conger and return before the ice broke up.

May 22 Dr. Dedrick reached the ship. The transportation of supplies, principally dog food, to D'Urville, was continued to the middle of June, when everything then available was removed from Payer Harbor.

Henson established a cache of pemmican at Cape Defosse, but was unable to reach Conger on account of deep snow.

During June work was carried on upon the winter quarters, the *Windward's* deck house being transferred to the shore for that purpose, it being my purpose to utilize the Stein house for quarters for my Eskimos.

July 3, after several days' sawing, the *Windward* was freed from the ice, and at once steamed across to Littleton Island, where the Fourth was devoted to duck shooting. After this she proceeded to Whale Sound to hunt for walrus, 128 of these animals being killed and landed at Payer Harbor, but previous to the arrival of the *Erik*.

The subsequent movements of the ship are familiar to you, and do not need to be noted here.

Very sincerely,

R. E. PEARY, U. S. N.

H. L. BRIDGMAN,
Secretary,
Peary Arctic Club,
N. Y. City.

During the three weeks that followed, the work of the spring of 1900 was often recurred to, and many interesting facts and deductions were added by Lieut. Peary to his first statements. In his judgment, the journey demonstrates the termination of land, and eliminates completely Greenland from the Arctic problem. From the farthest North, 83:27, the coast to the east changes, and in place of the high, precipitous cliffs and deep fjords is a low, rolling foreshore, evidently the principal coast of the North. Lieut. Peary pointed out a very striking similarity between the coast to the east and to the west of Lincoln Sea, the characteristics of Cape Hecla being almost identical with those to the northern point and east, while those to the west of Cape Hecla are almost duplicated by those to the east of the point, running completely around to Independence Bay.

The story of Mrs. Peary's winter in the *Windward* was equally

interesting, though less important from a strictly geographical and scientific point of view. Reaching Etah late in August, 1900, Peary's orders to cross Smith Sound and proceed as far north as possible were found, and every effort was made to follow them. The ship was, however, beset by ice at Cape Sabine, and further progress made impossible. Winter quarters were established in Payer Harbor, and here for eight months Mrs. Peary and Miss Peary remained, ice-bound, imprisoned on the *Windward*, yet passing the winter with a fair degree of comfort. Miss Peary played on shore in the open air every day with her Eskimo comrades, and three unsuccessful efforts were made to reach Fort Conger and effect, if possible, a junction with Lieut. Peary. The last was successful to the extent that, coming south, Peary met the party April 30, 1901, at Cape Hayes, and pushing on, reached the *Windward* at 3 o'clock on the morning of May 6, his birthday. The *Windward*, with the aid of saws, freed herself from the ice July 3, her deck-house having previously been landed to serve as headquarters during the winter of 1901–02; and during July Peary had killed in Inglefield Gulf 125 walrus for dog-food for the next campaign, all of which had been successfully landed at Cape Sabine the week before the arrival of the *Erik*.

With the two ships in commission, the walrus hunt was resumed for a week, when Lieut. Peary, taking the *Erik*, proceeded to Cape York, and later made a round of all the native settlements, collecting dogs, skins, and equipment for the campaign of the spring of 1902. The hunting party in the meantime, in a deer-hunt on the promontory between Olriks and Academy Bays, captured thirty fine animals, whose skin and flesh were of the greatest service to Lieut. Peary.

The *Erik* returned to Etah, and having on board all of the fruits of the three weeks' walrus and deer hunts, and of the trading expedition with the natives, left Etah on Saturday night, August 24, for Peary's headquarters at Cape Sabine, only 23 miles distant. After a persistent but fruitless struggle with the ice, it was obliged to land Mr. Peary and his party in a temporary camp on the south side of Herschel Bay on Thursday, August 29. Here Lieut. Peary proposed to remain until the ice should either permit him to go in his boats ten miles north to his headquarters at Cape Sabine or until it should be frozen sufficiently to enable him to go over its surface to the same destination. In either event he was likely to be comfortably established for the winter within a month at the furthest from the departure of the steamer. The *Erik* crossed

Smith Sound with no great difficulty, and completed her voyage at Sydney, C. B., September 13, being followed by the *Windward*, with Messrs. Robert Stein and Samuel Warmbath, of the Ellesmere Land Expedition, which arrived at Brigus, N. F., September 29.

Lieut. Peary expected to devote the autumn of 1901 to the musk-ox hunt and to exploration of the western portions of Grinnell Land, which would occupy him as long as the light continued. It is quite within bounds that he may find Eskimos who have never yet been seen by white men, and an encouraging presage of that was the unmistakable indications of a former settlement on the site of his temporary camp on the south side of Herschel Bay. Mr. Peary is abundantly supplied with the best dog-food, and will undoubtedly have, when taking the field in the spring, the largest and best pack of dogs which he has ever had. Seventy are now with him, and the natives who will visit him as soon as the light returns will doubtless bring others. It is his clearly-defined and declared purpose to proceed along the coast from Fort Conger to Cape Hecla, and thence to lay a course directly and in an air-line over the sea-ice for the Pole.

As to the final outcome, Peary's own words are: "Given a favorable season next year, I regard myself in better shape for the realization of my plans than I have been any previous year of my stay here."

CENSUS RESULTS.

BY

HENRY GANNETT.

INTERSTATE MIGRATION.—The native population of the United States, in 1900, was 65,843,302. Of these, 13,863,651 were living in States different from those in which they were born. This is 18.2 per cent. of the total population of the country, and 21.3 per cent. of the native population of the country. In other words, of the native population more than one person in five had left his State of birth.

If to this number we add that of the foreign-born, namely, 10,460,085, we find that of the total population no fewer than 24,323,736 have moved either from the State or country of birth. This is very nearly one-third of the population of the United States. These figures bring out in strong relief the amazing mobility of the people of this country. Our States are comparable in area with the countries of Europe, and if these figures be compared with the corresponding ones in Europe, it will be found that our mobility is in the ratio of probably ten to one as compared with theirs. Of course, the conditions are not parallel, inasmuch as a movement from one country to another of Europe involves a change of allegiance, and in many cases of language, both of which are obstacles to freedom of movement.

Examining the figures of interstate migration by States, many curious and interesting phenomena are disclosed. The extent to which some of the older States have contributed to the peopling of the newer ones is very large. Illinois has sent out over one million of her sons; Ohio more than one million one hundred thousand, and New York more than one million three hundred thousand. Pennsylvania has sent out nearly one million, and many States have sent out over half a million each. Expressed in terms of the proportion which the number of emigrants bears to the total population of a State (which is perhaps a fairer way of expressing the situation, inasmuch as it takes account of the population of the State), we see that Delaware, Maine, Nevada, New Hampshire, Vermont, and Virginia have each sent out more than thirty per cent. Indeed, Vermont holds the highest rank in this regard, since her emigrants are nearly one-half her present population. The number of States in

which this percentage ranges between 20 and 30 is eight, while in most of the other States the proportion of emigrants exceeded ten per cent.

On the other hand, we find certain States receiving native emigrants in enormous numbers. Illinois received nearly a million; Missouri, 855,000; Texas, 838,000; New York, 534,000, and Ohio, 508,000. Expressing the number of native emigrants in terms of the percentage of the present total population of the State, we find that in Idaho, Indian Territory, Oklahoma, Washington, and Wyoming, more than one-half of the present total population were born in other States, and in Arizona, Arkansas, California, Delaware, District of Columbia, Kansas, Montana, Nebraska, Nevada, North Dakota, Oregon and South Dakota, more than 30 per cent. were born in other States.

The net result of this movement of population is in some States a gain, and in others a loss, most of those in the eastern part of the country having lost, and most of those in the west having gained, although this rule does not hold good in all cases. In New England the three States of Maine, New Hampshire, and Vermont have lost as a net result of the migrations of the native-born. They have not received from other States as many people as have gone out from them. In Massachusetts, Rhode Island and Connecticut, on the other hand, there has been a gain, and, in the first two, a considerable gain. New Jersey, farther south, has also gained; and this gain is doubtless due to development of the manufacturing industry, which has enabled these States not only to hold their sons, but to attract the sons of other States. New York, Pennsylvania, and all the southern States as far as Mississippi, with the exception of West Virginia and Florida, have suffered net losses, and in some cases very large losses, by interstate migration. In West Virginia the development of the coal-mining industry has doubtless enabled it to hold its own, while in Florida the prevalence of frontier conditions has had the same effect. Of these States, Virginia is the heaviest loser, the net result to her being a loss of no fewer than 455,422. She has sent out of her sons to aid in peopling other States 589,692, and has received from other States 134,270.

The States in the Upper Mississippi Valley, Ohio, Indiana, Illinois, Wisconsin, and Missouri have sustained net losses, while Michigan, Minnesota, Iowa, Arkansas, Louisiana, and all the States west to the Pacific coast have made gains. The net losses of some of these States are very great, as New York has lost 666,000; Ohio, 612,000; Kentucky, 335,000. On the other hand, the gains of some States

are enormous. California has gained 364,000; Kansas, 422,000; Oklahoma, 309,000, and Texas the enormous total of 629,000.

Adding together the number born in each State and still remaining there, and the number born in the State who have migrated from it, we obtain the total number of persons in the country who were born in each State, wherever living at the time of the census. The proportion of those remaining in the State and those who have left it is significant of the economic conditions of the State. The average proportion of migration to the total native population is a little over one-fifth, or 21 per cent., and we may assume that within five per cent. of this average the conditions do not differ greatly from those of the average of the country, and we may therefore consider only those States which depart more widely than this from the mean. Those States which have a low percentage of migration are Arizona and Texas with 9 per cent.; California, Florida, and Louisiana with 10 per cent.; New Mexico with 12 per cent.; Oklahoma and West Virginia with 14 per cent. Most of these will be recognized as frontier States. Florida falls in this category, as the southern half of the peninsula is almost unsettled, and settlement is pushing south gradually year by year. West Virginia is holding her sons because of the development of coal-mining within her borders. Louisiana is a peculiar case. In large part it is settled by a sedentary population of French origin; it contains also a large city with rapidly-increasing commerce.

At the other end of the scale we find Illinois, Indiana, and Virginia with 26 per cent. of migration; Maine and Ohio with 28 per cent.; Delaware and Iowa with 30; Kansas with 32; New Hampshire with 34; Wyoming with 35; Vermont with 41; and Nevada with 44 per cent. Among these States we find three different causes operating for the large emigration. The small States lose greatly in proportion, simply because of the size. One has to travel a less distance to get out of Delaware, New Hampshire, or Vermont than from larger States. Again, in Maine, New Hampshire, Vermont, Delaware, Virginia, Ohio, Indiana, and Illinois we have States which are quite fully populated for the prevailing industry—that of agriculture. They are States which are ripe for an industrial change from agriculture to manufactures, and in all of them that change is going on, but is in different states of progress in different States, and meantime these States are unable to hold their sons, who go forth to new and fresher fields. In Kansas the economic conditions have been much the same, but from a different cause. Settlement spread rapidly in the late 80's over the western

part of the State, induced by a series of seasons of heavy rainfall. Subsequent droughts depopulated the country and scattered settlers far and wide.

The excesses of emigration in Wyoming and Nevada are due, perhaps, merely to the restless character of their settlers; and in the latter State there is another element—the partial failure of the mines, which has resulted in an absolute reduction of its population.

The drain of native population from the northeastern States has been, in part at least, made up by foreign immigration; but the southern States have received no foreign immigration, and the drain upon them has been made up, when made up at all, only by natural increase.

FOREIGN-BORN POPULATION.—The population of the United States in 1900 which was of foreign birth numbered 10,356,644, being 13.7 per cent. of the total population. The proportion was smaller than in 1890 by 1 per cent., owing, doubtless, to the diminishing immigration and the return of immigrants, on account of the prevailing depression in business.

The countries which have contributed most largely to the foreign element are as follows, with the number from each:

Germany	2,666,990
Ireland	1,618,567
Canada and Newfoundland	1,181,255
England, Scotland and Wales (Great Britain)	1,169,626
Norway, Sweden, and Denmark	1,064,309
Italy	484,207
Russia	424,096
Poland	383,510
Austria	276,249
Bohemia	156,991
Hungary	145,802
China	81,827

The above figures, together with those of former censuses, show that great changes are going on in the constitution of the foreign-born element of our population. We have statistics of each census since 1850. At that time the Irish formed the principal element, constituting not less than 42.85 per cent. of the total foreign element. This proportion has steadily diminished for half a century, until now the Irish form only 15.62 of the foreign-born element. In 1850 the Germans were second, with 26 per cent., and in 1860 they increased to 31 per cent., and held a proportion of about 30

until the last census, when their proportion has diminished to 25.75 per cent. The third element was the British, including natives of England, Scotland, and Wales, which in 1850 formed 16.89 per cent., or about one-sixth of the foreign-born element. That proportion has diminished quite steadily, until in 1900 it was only 11.29 per cent. Thus these three, the largest elements in 1850, have all diminished proportionately. The next element of magnitude was the natives of Canada, which formed in 1850 6.58 per cent., and now form 11.45 per cent.

In 1850 there were no other nationalities represented in any considerable number. The natives of Scandinavia — Norway, Sweden, and Denmark—formed less than 1 per cent., and they now form a trifle over 10 per cent., having increased continuously during the half-century. The Russians were very few in number, but now number over 4 per cent. Hungary was not represented at all, but now has 1.4 per cent., and Bohemia, which is first represented in 1870, now has 1.5 per cent. The Poles first appeared in the census of 1860, with a fraction of 1 per cent., and they now have 3.7 per cent. The Italians in 1850 formed .16 of 1 per cent., but have increased steadily, and in recent years quite rapidly, forming in 1900 4.67 per cent.; and the Chinese, whose numbers were absolutely trifling in 1850, increased up to 1880, when they formed 1.56 per cent., and since then, owing to the Exclusion Act, they have diminished, thus demonstrating its efficiency.

Thus the Russians, Huns, Poles, and Italians, collectively, which fifty years ago were present in this country only in trifling numbers, have increased until now they form 13.86 per cent., or about one in seven of the entire foreign element; while the British, Irish, and Germans, which half a century ago formed not less than 86 per cent. of the foreign-born population, now constitute only a trifle over half of it.

NOTES ON GEOGRAPHICAL EDUCATION.

BY

RICHARD E. DODGE.

PHYSICAL GEOGRAPHY AS A COLLEGE ENTRANCE SUBJECT.—The increased importance of physical geography as an entrance subject for colleges is shown by the recent action of the College Entrance Examination Board of the Middle States and Maryland in adding this subject, among others, to the list of subjects in which examinations were given by the Board last year.

The requirement in physical geography, as presented by the Board, is conformable to the other science requirements in being based on the Report of College Entrance Requirements made to the National Educational Association in 1899. The requirement demands one year of school laboratory and text study of physical geography from a modern point of view, and "includes material for the most part common to the leading text-books, though it should be recognized that no adequate laboratory manual is at present available."

The field of physical geography in secondary schools is recognized as including the earth as a globe, the ocean, the atmosphere, and the land. In the detailed requirement published by the Board the several large topics under each division are outlined, with the recommendation that the time allowance be proportionately increased in the order named above. A study of the requirements as outlined by the Board will show that certain topics generally included in a secondary course in physical geography are omitted. Such, for instance, is the topic of light, which belongs to physics and not to physical geography, though it is included in the topics recommended for such a course in the 1900 syllabus of the Regents of the University of the State of New York. It is further recommended by the Board that each topic be treated so far as to show its causal relation to other topics, and that so far as possible the effects of earth features on life conditions be emphasized. The candidate's preparation should include:

a. The study of one of the leading secondary text-books in physical geography, that the pupil may gain a knowledge of the essential principles and of well-selected facts illustrating those principles.

b. Individual laboratory work, comprising at least forty exercises. From one-third to one-half of the candidate's class-room work should be devoted to laboratory exercises. In the autumn and spring, field trips should take the place of laboratory exercises.

Such a definite and ordered requirement as is presented by the Board ought to make the geography work in secondary schools more scientific in character and more logical in method, through the emphasis of the causal side of physical geography, so that so far as can be causes may precede effects in presentation.

The report includes also a series of suggested exercises, from which the forty exercises presented by the pupil may well be selected. After each problem suggested is given its value as a proportionate part of forty, that will be assigned to it. These exercises are to be recorded in a note-book, and the note-book must be presented at the examination. Furthermore, the note-book must be the *original* note-book, and not a copy. "This book should contain an index of subjects, and must bear the endorsement of the teacher certifying that the notes are a true record of the pupil's work."

It is believed that such a recognition of the value of physical geography as a college entrance subject will have a beneficial effect on the subject as taught in the colleges and universities and the secondary schools. Students will be able to come to their college work with some training in the elements of the subject, and the secondary schools having a definite plan to follow, which will be acceptable to the leading colleges, will have an incentive to improve the character of their geography work, so as to make the subject more disciplinary and less encyclopedic in character. Through uniformity of requirement the schools will be able to fit pupils for any college, and thus save a certain scattering of energy that now prevails in secondary schools.

If now we can have a laboratory manual adaptable to secondary work in physical geography, and if the same course that is acceptable for college entrance be also accepted by the Regents of the University of the State of New York, the character of secondary geography work in the schools of New York and vicinity ought to be vastly improved in the near future.

School Journals of Geography of America.—Five years ago, in obedience to the suggestion of several educators who were in touch with the school conditions of the country, the *Journal of*

School Geography was started, with the purpose in mind of aiding the teacher of geography in elementary schools. Two years later the scope of the *Journal* was enlarged to include secondary work as well. During the five years the *Journal* has presented many strong articles from geographers and teachers of geography that have been cordially endorsed and widely approved in all parts of the world. The success of the *Journal* has been greater than was anticipated, and has shown that there is a rapidly-increasing body of teachers who desire the newest and best in school geography.

Two years ago a second school journal devoted to geographical education was started by Professor Edward M. Lehnerts, of the State Normal School, Winona, Minn., under the title of the *Bulletin of the American Bureau of Geography.* This journal has been well illustrated and attractive in character, and has proved a great success in every way. There is, however, no reason for rivalry in so limited a field as geography teaching, but rather every reason for co-operation and the most efficient expenditure of energy.

For these reasons the two journals noted above will cease to exist after January 1, 1902, and will be replaced by a new journal called *The Journal of Geography, Devoted to the Advancement of Geographical Education.* The new *Journal* will be under the combined editorship of the editors of its predecessors, and of Dr. J. Paul Goode, of the University of Pennsylvania. The *Journal* will be issued ten times a year, and will contain 480 pages to the volume. The board of associate editors will contain the leading workers in geography in the country, and will include a representative from nearly every branch of special geography. It is hoped that the new paper, succeeding to such well-founded prestige, may be vastly superior in every way to its predecessors, and the possibility of such a paper shows, perhaps more conclusively than other things, the improvement in all phases of geographical education since the appearance of the memorable Report of the Committee of Ten, nearly a decade ago.

THE SECONDARY SCHOOL COURSE OF STUDY IN PHYSICAL GEOGRAPHY IN NEW YORK STATE.—The New York State Science Teachers' Association has in its five years of existence done much in presenting the need of improved work in physical geography in the secondary schools of New York State. At the 1900 annual meeting, a Committee of Seven was appointed to present a course of study to the Association this year, with recommendations for laboratory work. As the Committee was not completed until late

in the past summer, it will present this year only the proposed course of study. It is planned by the Committee to have the course of study follow the suggestions of the Report on College Entrance Requirements of the National Educational Association, and at the same time fulfil the needs of the requirements of the College Entrance Examination Board of the Middle States and Maryland. The report, when completed, will probably be printed by the University of the State of New York in the report of the 1901 meeting of the State Science Teachers' Association. The Committee of Seven consists of Principal George H. Walden, of Grammar School No. 10, Rochester, N. Y.; W. W. Clendennin, Wadleigh High School, New York City; C. Stuart Gager, of the New York State Normal College, Albany, N. Y.; Frank Carney, of the High School, Ithaca, N. Y.; P. F. Piper, of the High School, Buffalo, N. Y., and Richard E. Dodge (Chairman), of the Teachers College, Columbia University.

GEOGRAPHY AT THE NEW YORK STATE SCIENCE TEACHERS' ASSOCIATION MEETING, 1901.—The Earth Science Section of the New York State Science Teachers' Association will devote two half-day sessions to the problems of geography at the approaching meeting. The first session will be devoted to geography work in normal schools, the discussion being led by Professor C. Stuart Gager, of the New York State Normal College, Albany; Professor A. W. Farnham, of the Oswego Normal School; Principal C. T. MacFarlane, of the Brockport Normal School, and Professor Will S. Monroe, of the Normal School, Westfield, Mass. The second session will be devoted to a discussion of the Report of the Committee of Seven, led by C. F. Wheelock, Head Inspector of the Regents of the University of the State of New York, Miss Belle Meserve, of the Utica Free Academy, and Professor A. P. Brigham, of Colgate University.

AN IMPORTANT REPORT OF ELEMENTARY SCHOOL GEOGRAPHY.—The New England Association of School Superintendents in 1900 appointed a committee to report on the subject of school geography in 1901. The Committee consisted of Superintendent Horace S. Tarbell, of Providence, R. I., author of a well-known series of geographies, Superintendent Louis P. Nash, of Holyoke, Mass., and Principal F. F. Murdock, of the State Normal School, North Adams, who has contributed largely to the literature of geography teaching, and especially in a little book known as a Teacher's Outline of Elementary Geography.

The Committee submitted a printed report of 66 octavo pages at the 1901 meeting of the Association in November, which report deserves to be read, analyzed, and digested by every one interested in the betterment of school geography.

The report opens with an attempt to answer the following questions from the school standpoint:

1. What is commonly understood by the term "geography"?
2. What is the value of geography?
3. What are its aims?
4. What is the distinction between the *Old* geography and the *New?*
5. Is geography a science?
6. What are its scope and limitations?

The question as to what is geography is presented by reviewing the definitions of geography as given in the leading dictionaries, in the reports of the Committees of Ten, of Fifteen, and of Twelve of the National Educational Association, by showing the scope of subjects included in the *Scottish Geographical Magazine* for 1900, and by giving the contents of Professor Wagner's *Lehrbuch der Geographie.* Strangely enough, the Committee has overlooked Dr. H. R. Mill's classical shorthand definition of geography as "the study of the earth in its relation to man" and his longer definition, included in his International Geography, to the effect that "Geography is the exact and organized knowledge of the distribution of phenomena on the surface of the earth, culminating with the interaction of man with his terrestrial environment."

As regards the value of geography, the Committee, after quoting from Dr. Harris, announces that "as a source of information, valuable in itself and not merely as an instrument, it (geography) has no equal among its associate subjects."

The Committee presents for aims to be more or less attained through geographical study: 1.—Training in seeing the facts of geography about one; 2, making the learning from books and the printed page a power and a habit; 3, "to establish the habit of considering facts and making inferences thereon: the reasoning involved in the right study of geography is more closely like that of mature life than that in any other school exercise;" 4, the fourth purpose is "to gain such knowledge about the earth and its inhabitants as shall make us know the world we live in, both as to the land on which are spread out the nations and the people, with their varied means of providing for continual, essential and universal wants."

In comparing the Old geography and the New, the Committee emphasizes especially the point of view now held in reference to geography because of the doctrine of evolution, and shows that many so-called "new" geographies are new only in date and not in spirit. In contrasting the mental effects of the old and new points of view in reference to the subject, the Committee says, "Instead of limiting explanations and reasons to the single chapter on climate, as was the case with the geographies of the older type, the geographies having modern thought as their basis carry throughout all their chapters the fundamental idea of a succession of effects from evident causes, constantly appealing to this thought and constantly illustrating it, teaching that a reason for a present fact can be found by reference to antecedent facts readily inferred and to forces readily comprehended."

To show that geography is a science the Committee reviews the three stages in the development of a science:

> In the first no boundaries between them are seen, and all knowledge pertinent to their common foundation is gathered and discussed;
>
> In the second, the boundaries between them are upreared, and the fields between these boundaries are separately cultivated;
>
> In the third stage, a wide familiarity with several of these separated fields of study enables the advanced student to perceive the underlying strata of principles, to make broad generalizations and to see the several sciences in the unity of their fundamental relationships.
>
> In a sense the knowledge of geography may be considered as existing in all three stages according to the maturity, ability, and scholarship of those to whom its varied subject-matter appeals.
>
> To the children in our elementary schools it is in an indefinite form knowledge about the earth's surface, the treasures within and the life thereon.
>
> To those who have studied the subject somewhat, and to specialists in other fields it appears in the second stage. These students rear high walls about it.
>
> To those who have widely studied the science, the natural lines of division between its several branches appear, and also the fundamental unity that makes its several divisions one.

In furtherance of the same point the Committee shows that geography is a many-sided science, that closely interrelates with many other sciences. Because of these many interrelations it is necessary to choose the facts and geographical laws that are essential and yet adapted to children in elementary grades. The pages on the scope and limitations of geography are devoted to showing that it is hard to keep non-geographical matters out of a subject so long considered as a catch-all as geography has been. Particular emphasis is laid upon the fact that as a rule the technical processes of industries are not geographical. "Geography proper

stops with the raw material and transportation." An excellent caution is inserted to the effect that the new geography may be as easily overloaded with details as was the old-fashioned, so-called "sailor geography," with its "burden of unimportant rivers and capes and petty towns."

The relations of geography and other subjects are suggestively shown by bringing the relations to geometry, drawing, and arithmetic through the necessary study of direction, distance, and form; to literature and art, through the proper introduction of description or picture; to history, in the emphasis of the effects of environment on the ongoing of man; to nature study, through observation of life and its surroundings.

The report then considers the attitude of a child's mind at different stages and hence the method of teaching that must be followed if the work would be effective:

> The appearance, relative position, activities, and simple uses of geographical objects, the obvious causes and effects, the ready comparisons and generalizations, are the products of observation, imagination, and simple reasoning, and are the content of Elementary Geography.
>
> The less obvious activities and relations, the deeper causes and effects, the classes, principles, and laws of geographical phenomena are chiefly products of comparison, generalization and reasoning, and are the content of Scientific Geography.
>
> Elementary Geography is the portion for primary and grammar schools. Scientific Geography is the high school and college portion.

Based on these principles a general course of study is worked out for the whole elementary school, with the work divided according to grades, and with special emphasis of the methods to be employed and the pitfalls to be avoided. The Committee recommend that the first four years be devoted to a preliminary study of geographical objects and particularly of those elements that enter into a child's life. Detailed suggestions are given. The fifth and sixth year are to be devoted to the world as a whole, the sixth and seventh year to the continents, and the eighth year to the leading nations and the State, with a comparative study of the world in the ninth year.

It would seem that the Committee recommends a course that is unnecessarily slow, for there seems to be no reason why the world as a whole should be postponed so late or considered so long. Again, it would seem rational and necessary to have the study of one's own country more fully done in the earlier years. It should be remembered, however, that no course of study can fit all schools and all areas. The Committee has done well, therefore, in making its suggestions elastic, though definite.

The report is especially strong in showing what should not be done in geography and the geographical reasons therefor. No single publication along this line of such practical value to the non-geographically trained teacher has come to our attention.

Recent Work of the Geographical Association (Britain).—The Geographical Association of Britain, after eight years of unremitting and promising labor, has recently taken a great step in advance in inaugurating a new magazine for British teachers, called *The Geographical Teacher*.

For several years the Geographical Association has taken advantage of the possibilities furnished by the *Journal of School Geography*, and has at the same time actively exploited the necessity of a teachers' journal of geography that should be distinctly adapted to the progress of British teachers, and thus more valuable than any American journal could be.

The increased interest in geography teaching largely due to the Association, and the faith in the future evidenced by certain members of the Association, have resulted in the new journal noted above. *The Geographical Teacher* is under the editorship of Dr. A. W. Andrews and Dr. A. J. Herbertson, and is published by G. Philip & Son, at one shilling a number. The *Journal* will appear in October, February, and June. If the standard set in the first number is maintained, the new journal will be of interest and help to teachers of America as well as Britain.

The scope will be broad, and yet the papers will be practical and helpful in tone while they are scientific in character.

It will contain articles on methods of teaching in the class-room and in the open air, on the combination of geography with other subjects in the school course, *e. g.*, geography and history, geography and classics, on syllabuses, on ordnance maps, on typical religions of the globe, especially in the British Dominions and India, on the great cities of the world, and a special series of articles on the Colonies, contributed by Colonial writers. It will criticise existing examination programmes and current examination papers, and review recent geographical literature, maps and appliances from the teacher's point of view.

The active teachers and the leading geographers of Britain have guaranteed their co-operation, and the editors announce a very attractive series of papers ready for publication. The first number is attractive in appearance as to form, paper, and typography, and several of the papers are of very general interest, and should be broadly read in this country.

The Geographical Teacher is sure to be of great value in the field to which it is addressed, and must succeed. It is especially

welcome as a sign of the times in Britain that geography is being recognized by schools as worthy of a place on a school programme, not only as a culture subject, but for its value in giving mental discipline.

With the new journal, and the other opportunities furnished by the Association in the way of loaning of slides, in the exchange of photographs, in the furnishing of a clearing house of information for teachers, and in bringing about the publication of such helpful books as Dr. Mill's *Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading*, the Geographical Association has proved its importance and its power. May its good work increase and may success continue to attend it!

MAP NOTICES.

BY

HENRY GANNETT.

CARTE LITHOLOGIQUE SOUS-MARINE DES CÔTES DE FRANCE, PAR M. THOULET, PARIS.—This map, of which nine sheets have been issued, shows by contours the depth of water off the French coast, and by colours and conventional signs the character of the sea bottom, that is, of the rocks, gravel, etc., or whether covered by vegetation.

SINCE THE LAST ISSUE of the Bulletin, the United States Geolo-ical Survey has published 17 sheets of its atlas of the United States. In Maryland are two maps, Ocean City and Belair. The former represents part of the coast, including a little of Delaware, showing the continuous sand-bar, back of which are open bays, succeeded by marshes out of which the land rises gradually. The latter lies inland just touching the Susquehanna river in the south-east corner, and represents a rolling country in which the streams are slightly incised. Both of these sheets are on a scale of 1:62,-500, the first having a contour interval of 10 feet, the second of 20 feet.

In Illinois is one sheet, Rock Island, upon a scale of 1:125,000, with a contour interval of 20 feet. It represents a country of rolling prairies, with the Wapsipinicon river meandering in a broad, flooded plain.

In Wisconsin are three sheets on a scale of 1:62,500, with a contour interval of 20 feet. Poynette is in a country of glacial deposits of irregular character, with marshy streams and lakes. Denzer and The Zells are mainly in the driftless regions, in the southwestern part of the State, and show a region of low deceptive plateaux and prairie buttes.

In Missouri is one sheet, De Soto, in the eastern part of the the State. This is on a scale of 1:125,000, with a contour interval of 50 feet. It represents a bench country which has been graded and subsequently elevated, as is shown by the incised windings of the streams.

In Arkansas are three sheets, all on a scale of 1:125,000, with contour intervals of 50 feet. Gurdon is in a low and level country

bordering the Ozark Hills on the southeast, while Eureka Springs and Winslow are in the Ozark plateau in the northwestern part of the State. These represent the characteristic features of this plateau, which is greatly dissected, and the larger streams deeply incised.

In Indian Territory are two sheets on a scale of 1:125,000, and a contour interval of 50 feet. Ardmore, in the Chickasaw Nation, contains in its northern part the Arbuckle mountains, which have the form of a somewhat dissected plateau, rising 500 feet above the surrounding country. Nuyaka is in the Creek Nation, and represents a country with very little relief.

At the junction of South Dakota, Nebraska, and Iowa is the Elk Point sheet, showing the Missouri sweeping in broad curves through a bottom land ten miles in width, in which it is joined by the Vermilion and Big Sioux rivers. From this bottom land the bluffs of the high prairie rise 200 to 300 feet. This sheet is especially interesting to the physiographer as a study in river movements.

In Montana is one sheet, on a scale of about 2 inches to a mile, with a contour interval of 50 feet, representing a mining region about Marysville.

In California are three sheets. Redding shows the upper end of the great Sacramento Valley, with the foot-hills of the Sierra Nevada and long spurs of lava running from them down into the valley, separating tributaries of the Sacramento. San Jacinto is in southern California, and shows the San Jacinto mountain group with San Gorgonio Pass and a bit of the desert east of it. It contains several good illustrations of alluvial cones. Both these sheets upon a scale of 1:125,000, with a contour interval of 50 feet. Redlands sheet, on a scale of 1:62,500, shows a part of the San Bernardino range in southern California and a part of the valley of the Santa Ana south of that range.

THE GENERAL LAND OFFICE has published a new edition of its map of the State of California. This is in effect a new map, and a great improvement over former issues. The scale is twelve miles to an inch, in this respect being uniform with the other State maps of this series.

Lakes, rivers, etc., are printed in blue, and the relief is expressed by brown crayon shading.

THE ARGENTINA-CHILE BOUNDARY.—These two republics, the most powerful and progressive of South America, are at logger-

heads over the location of their common boundary. Instead of going to war over it, however, they have very sensibly referred the settlement of the dispute to Great Britain as an arbiter. The case of Argentina has been printed in four volumes and a portfolio of maps.

The difficulties between these countries have originated simply in ignorance of the principles of geography. It appears that in all their treaties concerning limits the common boundary has been defined as the "summit of the Andes," to which, unfortunately, is added as a synonym the "water parting." It is well known to geographers that a mountain range may or may not be a water parting, a divide; but treaty-makers have not yet learned that mountain ranges and divides are not synonymous terms.

Over most of the course of this boundary the crest of the Andes and the divide between Atlantic and Pacific drainage coincide, and there is no difference of opinion concerning the location of the boundary; but in the southern part, where the west slope receives a heavy precipitation, the rivers have extended their heads across the range, have captured many considerable streams on the east of the range, and now head far out on the Pampas. Here the Chileans claim that the water divide should be followed, while the Argentines hold to the summit of the Andes, and a large territory is, in the aggregate, in dispute. The decision of the arbiter in this matter will be of interest.

Another area, near the northern end of the line, is in dispute, from a different cause. Here the range is in two parts, separated by a territory scores of miles in breadth. This tract, which has an average elevation of perhaps 10,000 feet above the sea, has no outlet to either ocean, and the question to be determined is, Which of the two bordering ranges is the Andes?

Of the maps accompanying the case, which number sixteen, arranged in a portfolio, three require special mention.

Number 1 represents a large area in the northwest of Argentina, showing the region which has no drainage to either ocean, and is bordered by high mountains upon the east and west. This is upon a scale of 1:1,000,000, and the relief is expressed by crayon shading.

Number 12 is an orographic map of the Andes region south of latitude 39. The scale is 1:1,000,000, and relief is expressed by colors at intervals of 500 metres.

Number 14 is a general map of South America, south of latitude

39. It is on a scale of 1:1,000,000, and relief is expressed by hachures.

The other maps in this series represent details of the region shown in general in Numbers 12 and 14. These maps range in scale from 1:100,000 up to 1:500,000. Upon the larger scales the relief is expressed by contours, and upon the smaller scales by crayon shading.

Upon all these maps the fiord character of the Pacific coast is beautifully drawn out, as well as the glacial forms in the mountains. Physiographers will find much material for study in them.

Mappa Geographico do Estado do Amazonas, organizado por Ermanno Stradelli de accordo com suas notas e explorações e baseado nos melhores Mappas—1901. Escala 1:2,222,000 (about 35 miles to an inch). Streams are in blue, and relief is expressed by brown hachures. The map is based in part on original work, and in part is compiled from a variety of sources.

Amazonas, the northwest State of Brazil, has an area of 732,500 square miles (being far the largest of the States), and a population of only 148,000, or one inhabitant to 5 square miles, the only inhabited portions being the river banks.

The map represents the main streams of this area, most of them in all the detail that the scale will permit. The relief is, however, very feebly expressed.

NOTES ON AMERICAN FORESTS AND FORESTRY.

BY

ALBERT PERRY BRIGHAM.

In his recent message to Congress, President Roosevelt has given authoritative expression to the public interest in our forests and to the demand for their preservation. He urges an increase of the forest reservations and the management of them upon business principles. He shows his familiarity with practical conditions in asserting that forestry contemplates the perpetuation of the forests by use, and not by a withdrawal of forest resources. It appears that responsibility in this field is much divided. Protection of the reserves lies with the General Land Office. The United States Geological Survey is charged with the description of timber, while the Bureau of Forestry provides plans for forest management. The President advises that all of these duties should belong to the Bureau of Forestry of the Department of Agriculture. Commenting on the relation of forests to water supply and irrigation, it is then suggested that "forest and water problems are perhaps the most vital internal questions of the United States." Particularly should the reserves be protected from over-grazing, as by sheep, which drives away much wild game and impairs the capacity of the surface for water storage. Our highest sylvan ideals are expressed in the President's closing words:

> The forest reserves should be set apart forever for the use and benefit of our people as a whole, and not sacrificed to the shortsighted greed of a few.

SCHOOLS OF FORESTRY.—In 1898, by an act of the Legislature, the New York State College of Forestry was established and placed under the supervision of Cornell University. This was the first school of this kind in America. Professor B. E. Fernow, LL.D., is Director of the College, which has three professors of forestry and several special lecturers. In addition, nearly forty members of the Faculty of the University give courses which are supplementary to forestry. Twenty-five regular students are reported, with twenty-nine from other departments taking certain courses. The work in Forestry proper occupies two years, but a four-year course, beginning with basal subjects, leads to the degree of Bachelor of the Science of Forestry. There is also a short course for

farmers, lumbermen, and other interested persons. Seminary work is done in German, forestry, literature, and lecture courses, and excursions are devoted to fish-culture and game preservation.

The State has provided the College with 30,000 acres of forest ground at Acton, Franklin County, in the Adirondack region. Here the Junior and Senior classes spend the entire spring term in practical work. This reservation, after thirty years, is to be deeded to the State, and held thereafter as a part of the forest preserve.

Some important principles of practical forest management are brought out by Director Fernow in his annual reports, which are devoted quite largely to the progress of work in the Adirondacks. The general policy contemplates some curtailment of present revenue—by leaving trees that might be cut; by careful logging, so as to save standing trees; by clearing brush and replanting certain areas. The white pine and the spruce are the most desirable timber trees; but the former has been almost eradicated, and is difficult to replace because intolerant of shade. The spruce, therefore, is to be conserved especially, and the main cutting is done upon the mature hardwoods. Spruce is tolerant of shade, and is to be developed by saving the young trees, and sufficient of the older trees, for seed.

The Director emphasizes the fallacy of the idea that forestry consists in preventing the cutting of trees. Wise harvesting and conservation are the true aims. The College forest, therefore, should afford an example of practical forest management, and be made, so far as possible, self-supporting. This is no easy task when it is remembered that part of this tract had previously been culled by the lumberman. The school, therefore, is not a heavily-endowed institution which has been given a virgin forest to manage on perfectly ideal principles. It takes a culled tract and, by thinning and planting, seeks to win steady returns and secure at the same time the development and permanence of the forest. This, as it seems to the writer of these notes, should be a sufficient answer to certain hasty reports of excessive cutting in the College forest.

One difference between this management and ordinary lumbering appears in the fact that all the top wood is worked up, and, to some extent, even the brush wood is utilized.

In 1900 the Yale Forest School, or Department of Forestry in Yale University, was founded through the munificence of Mr. James W. Pinchot and members of his family. Henry Solon Graves, M.A., is the Director. The Faculty includes professors of fores-

try, special lecturers, and various members of the teaching staff of Yale University. Regular courses now include thirty-one students, representing seventeen colleges and universities. There is also a summer school at Milford, Pa., enrolling, by the last report, twenty-seven students. Field study is provided in the Yale Botanical Garden, in certain forests near New Haven, on lands made available in the Adirondacks and White Mountains, and on the forest estates of Mr. Pinchot, at Milford, Pa. The course covers two years, and those who come to it with the Bachelor's degree from a college of high standing, or have gained equivalent training, may receive the degree of Master of Forestry. The summer course is designed for owners of woodland, forest rangers, teachers, and any others who wish information in this field.

The Biltmore Forest School is conducted by C. A. Schenck, Ph.D., at Biltmore, N. C., upon the George W. Vanderbilt estate. The school does not confer degrees, but gives a course of instruction covering twelve months in theoretical and practical forestry. The lectures cover the usual subjects, and are given during two hours of the morning. In the afternoon the young men are in the saddle, accompanying the director to any point where he is supervising work on the forest estate, which comprises 110,000 acres. Summer lectures are given in camp in the mountains. We are told that

> the life at Biltmore puts the student to the test, bringing out his capabilities and answering for him the question whether or not forestry is that profession to which he is willing to devote his life.

The circular of the School defines American forestry as "the art of developing and exploiting forestal investments." Thus Dr. Schenck appears to be quite in harmony with the practical ideals set forth by the directors of the Cornell and Yale schools. Accordingly, on the Vanderbilt lands, some areas are devoted to tree growth, the higher mountain areas are given up to grazing, and the cuttings are guided by the markets and the proximity of the timber to Asheville.

Private Forestry in the Adirondacks.—Director Graves of the Yale Schools is the author of Bulletin 26, Division of Forestry, dealing with Practical Forestry in the Adirondacks. Working plans were prepared for two large tracts belonging to private owners. One is Nehasan Park, the property of Dr. W. Seward Webb, and the other is the Whitney Preserve, of 68,000 acres, about Little Tupper Lake, owned by Mr. W. C. Whitney. In the latter

we have the first case of systematic forestry by a lumber company in the Adirondacks. Work in the Adirondacks is of special interest because the State has holdings of 1,100,000 acres in that region. No lumbering is allowed on these State lands, though it is stated that conservative cutting will doubtless in time be undertaken. The State can afford to leave more capital invested in standing timber than is possible with private owners. Thus, for financial reasons, such holders must often depart from the procedures of ideal forestry. We must set aside some rules used in Europe, because we cannot afford to observe them. As a sample of these concrete difficulties, the individual owner cannot bear the continuous burden of taxation, the fact being that taxes are reduced about one-half after lumbering. "Every plan of forest management in this country," says Mr. Graves, "must be in a measure a compromise between the owner of the forest and the forester."

Measures shown to be unprofitable on the two preserves described are thus enumerated—maintenance of a sustained annual yield; removal of dead and unsound trees; thinnings and improvement cuttings; permanent roads; planting, and fire lines. All these things are desirable, but cannot be done without loss. For example, a sustained annual yield is the ideal result of forest care; but such cutting is too expensive, and resort must be had to periodic lumbering.

It may be asked, what *is* practicable? In reply, it is to be said that the losses and destruction due to careless lumbering may be prevented. Thus the cutting of high stumps causes large losses, in extensive tracts. Much top wood is left to decay. This may, in part, as on the Cornell Reservation, be worked up into wood alcohol or other products. Valuable young trees, as spruce and pine, should not be used for skidways and roads. Careless crushing of small trees in felling and hauling can be avoided. A proper diameter limit is to be fixed for cutting; trees are to be left for seed, and fires may be held in check by due precaution, even though fire lines are impracticable.

Our National Parks.—Under this title Mr. John Muir has brought together several papers originally published in the *Atlantic Monthly*. It is not a book of forestry, but the forest is the most frequently recurring theme in it, and is described with all of the author's enthusiasm and poetic appreciation. His avowed aim is to promote the love and preservation of the wild forests of America. An introductory general chapter on our Parks and Forest Reserva-

tions is followed by accounts of the Yellowstone Park, and of the Yosemite in particular, whose forests, gardens, animals, and streams fall, one after another, under Mr. Muir's keen eye.

He follows with the sequoia, a tree which occupies a tract 260 miles long, but is most abundant within a range of 70 miles. Something is known by all, of these great trees; but one can never read without wonder of forests in which mature specimens in good situation have an average diameter of 20 feet and an average height of 275 feet, with larger examples by no means rare, and one that is known to be at least 4,000 years old. Fifteen hundred years are needed for the maturing of the tree, and when grown it is almost indestructible, though it may be maimed by lightning and by fire.

The popular impression that the species is near extinction is scarcely true. While greatly restricted as compared with its distribution in some geological periods, it still has vitality in its Sierran home, and there is evidence of its recent extension. All that is needed to save these forests is to restrain the hand of man and let nature have her way.

The closing chapter reviews American forests broadly, and utters an ardent plea for their preservation. The volume is from the press of Houghton, Mifflin & Co., and is illustrated.

Forests of Alaska.—In the reports of the Harriman Expedition (noticed on another page of this Bulletin), Dr. B. E. Fernow has given a short sketch of Alaskan forests. They are a northern extension of the woodlands of the Pacific border; and, indeed, the only true forest is on the mainland and islands of the shore belt. The Yukon basin, or interior, is mainly open country, with islands of stunted forest. Spruce, birch, aspen, and poplar are among the trees of these inland forests, which are quite unlike those of the coast and more resemble those of the Atlantic region of the northeast. The poor development is attributed to the frozen subsoil, and the extremes of temperature, from above 100° in summer to −60° or below in winter. Important as these woods will be for local use, carelessness has already led to some destructive fires.

The coast forest deteriorates in going north from Washington and British Columbia. It ends about Cook Inlet and on Kadiak Island, but with evidence of recent migrations in that region. The Alaskan peninsula and the islands to the west do not seem to be unfavourable for forest growth. But during the dry season, when alone the cones release their seeds, the winds are not in the right

direction to populate those regions. The Alaskan forest has no Douglas spruce, almost no pines, and no great firs. It consists, mainly, of Sitka spruce and coast hemlock; the latter predominating. The timber-line near the shore varies from 1,800 to 2,400 feet, but is higher in some interior situations. Spruces six feet in diameter and 125 feet in height were measured about Sitka, but the trunks are knotty and poor. Some deciduous trees occur on river bottoms and along shores, including cottonwoods, willows, and alders. The "astonishing indifference" of the trees to glaciers close at hand is observed, and woody vegetation is reported as growing on the morainic covering of some ice streams—a fact of which Russell has described the finest illustrations, from the border of the Malaspina glacier.

The reserves of timber in Alaska are not, as some have reported, of large value, save for local use, both because of poor quality and difficult transportation. The Yukon and White Pass Railroad is built with imported ties, although it crosses a forested region.

GEOGRAPHICAL RECORD.

ASIA.

PHOTOGRAPHS OF LHASA.—Admittance to Lhasa, the sacred city of the Buddhists, has so long been denied to white men or other foreigners not of the Buddhist faith that the recent publication of photographs of the city and of Potala hill, surmounted by the palace of the Grand Lama, the head of the Buddhist hierarchy, is in the nature of a surprise. *La Géographie*, in its October number, prints a photograph of Potala, on the outskirts of Lhasa, one of a number of pictures taken last summer by a Russian subject, a Kalmuck chief named Ovché Norzounof. It is a view of the south side of the hill, which rises abruptly from the plain to a height of about 300 feet, and is surmounted by the imposing palace of the Grand Lama, 180 feet high, with its surrounding fortifications, temples, and monasteries. The picture, though very interesting, shows little detail, and was probably taken at a distance of a mile or more. *The Geographical Journal*, in its December number, publishes two photographs taken by a member of the Nepal Embassy to Pekin. The date of these pictures is not given, but they were probably taken before those of the Kalmuck chief. One is a general view of the city; the other shows Potala taken at the side of the south front of the hill, and so near it that much detail of the palace and its approaches is clearly shown.

These photographs are specially interesting as those of a city which has been forbidden to Christians since the expulsion of the Jesuit fathers in 1760. Only three Europeans, since that event, have succeeded in visiting Lhasa. An Englishman named Manning entered the capital in 1811 disguised as a Hindu doctor. The French missionaries, Huc and Gabet, disguised as Buddhist monks, spent several months in Lhasa in 1846, their long residence in China and their acquaintance both with the Chinese and Tibetan languages enabling them to lull suspicion. Since that time only non-European travellers have been able to reach the city, though many explorers have made the attempt.

Native Asiatic travellers, however, have been there and returned with records sufficient to give a fairly clear idea of the city and its environment. Conspicuous among them have been Indian pundits trained by the Government for geographic work, one of whom, Naïn Singh, made two journeys to Lhasa in 1866 and 1873, during

which he determined its astronomical position and its height above the sea. Another, the explorer A-K, or Krishna, in 1879–80 made a chart of the city on a scale of an inch to the mile, which was published in 1885 in *Petermanns Mitteilungen* and is reprinted with the photographs in the above-named magazines. Another Indian explorer, Chandra Das, who visited Lhasa in 1881–82, supplied the most comprehensive account of the city and its people written by any of the Indian explorers. Then came the Russian Kalmucks, Buddhists themselves, who took great interest in everything concerning the sacred city. One of them, Baza-Bakchi, made a pilgrimage from Astrakhan to Lhasa and published an account of his journey in a volume of 260 pages, the narrative being printed both in the Kalmuck and Russian languages. No translation of this work, which is said to contain much fresh information, has appeared in any Western language. Last summer the Kalmuck chief, one of whose photographs *La Géographie* publishes, made his second visit to the city.

Lhasa may be described as oval in form, and about five miles in circumference. The estimates as to its population vary greatly—from 10,000, not including the monks, by Baza-Bakchi, 18,000 by the Austrian traveller Kreitner, 25,000 by the pundit A-K, and 31,000, 18,000 of whom are monks, by Naïn Singh.

Distribution of Siberian Products.—The report of the Siberian Railroad for 1900 throws considerable light upon the economic condition of that country. The total grain shipments by the railroad amounted to 17,575,023 poods, wheat representing more than half of the quantity of cereals shipped. Nearly two-thirds of the grain was taken out of the country, the balance being distributed along the line of the railroad as far east as the stations on the Trans-Baikal division. Of the export grain, 3,588,000 poods were sent to the mining regions of the Urals, which find the Siberian wheatfields a nearer source of supply than those of southern Russia; 3,244,742 poods went mainly to other markets in the eastern part of Russia; 2,123,190 poods went to Baltic ports for export, mainly to Germany and Great Britain; and 1,430,660 poods went through north-east Russia by river and canal to Archangel for local demand and, to a small extent, for exportation to north-west Europe. This information, of course, does not apply to the large amount of grain shipped eastward by the water routes, but it will serve as an approximate indication of the proportionate distribution of the export grain of Siberia.

Nearly all the cereals are produced in the southwestern part of the country, and are received for shipment at railroad stations along the western 325 miles of the line. Most of the wheat is grown on the rich soil of the southern province of Semipalatinsk, and is sent down the Irtysh river, a part of it being transferred to the railroad.

Only 9,705 head of cattle were sent into Russia from the pastures around Kurgan and Petropavlovsk in the southwest, most of them going to the garrisons at St. Petersburg and Krasnoye-Selo, the military station southwest of the capital. A great deal of butter from the same districts was sent either to central Russia or to the ports for export.

Tea from China is the next most important article of freight. Most of the tea is still carried in summer by the water routes, which are well developed in Siberia, considering the comparative newness of the country. The Ob and Irtysh are navigable almost to their sources, and canalized rivers and canals supply east and west conections, so that grain and other products are carried in large quantities by water to the Russian frontier. It is interesting to observe that the water routes are still more extensively employed than the railroad. In 1890, only one-fifth of the iron and steel imported, one-tenth of the refined sugar, and one-third of the manufactures were carried by rail.

The detailed statistics graphically illustrate the predominance of agriculture over other industries; the special development of agriculture in the western and southwestern districts of Ishim, Kurgan, and Semipalatinsk; the formidable competition offered by the water routes in the short summer season; and the rapidly growing importance of the cities situated both on the navigable waters and the railroad (Condensed from the *Bulletin du Comité de l'Asie Française*, Nov. 1901).

AFRICA.

Troglodytes of Katanga.—A paper from the pen of Captain Lemaire, the African explorer, printed in *La Géographie* (Nov., 1901), seems to show that the reports of extensive limestone caverns in the Katanga district of the Congo Free State, inhabited by many troglodytes, have been exaggerated. These reports appear to have been started by a book entitled *Garenganze*, written by the missionary F. S. Arnot, who said (p. 198):

"Going northwest nearly to the Kalasa mountains, I had a good view of the famous cavern mountain, which is inhabited. The

great cave has two entrances, a distance of five miles or more apart, and within is a running stream. There are also many smaller caves and dens in this mountainous country in which the natives hide themselves. The entrances to these caves look like rabbit-holes. They form such perfect retreats that Msidi could extort no tribute from these people. Near the mouths of the caves they have millet gardens. They greatly feared my inspecting the caves, and I had to promise that I would not do so or none would have come near me."

A communication to the Belgian Royal Geographic Society (May 4, 1893), describing another cave, told of "troglodytes living in long galleries dug in the almost perpendicular wall of a cliff."

Lemaire's researches included a number of these limestone caverns, only one or two of which appear to be of considerable extent, and none of them is inhabited. At the village Molobo are seventy-five huts surrounded for protection by two or three rows of poles, which also enclose the entrance to two small caves that are reached by rough ladders. It may be that these underground galleries connect with a larger one, but none is inhabited in ordinary times. The caverns of Ki-Bué, three miles from Molobo, are interesting. Ki-Bué, on the right bank of the Lu-Fira river, is perched on the top of an almost perpendicular wall, in which are the entrances to the caves that serve as a refuge in case of trouble. The path leading to the largest cavern is dangerous, as it would be easy to fall from it into the river. The roof has been discolored by smoke; a proof that it is often occupied. Upon taking refuge in this cave the natives may consider themselves safe from enemies. But nothing has been done to improve the cavern for permanent residence. In time of peace the natives occupy the huts of their village. Lemaire saw neither women nor children; they were undoubtedly hiding in the caverns. The explorer says that while he believes the natives did not reveal to him all the secrets of their caverns, he saw enough to disprove the legend of "troglodytes" living in them.

Capt. Lemaire also explored other caverns, and he reached the conclusion that none of the natives is a troglodyte, properly so called. The tribes live in the midst of their fields; but in times of war they run to earth and keep quiet till the danger is over.

The Sombwe cavern, of which Arnot wrote, is composed of a series of fissures leading to a spacious hall, very humid and entirely dark.

The most important cavern found (Ki-Amakélé) is reached by

two circular cavities twenty to thirty-five feet deep, which communicate with the cavern. The descent is made by a ladder into a passage-way leading to a large hall decorated with calcareous formations. This hall has been closed by a recent fall of rock, but before the accident occurred Mr. Delvaux, exploring it, ascertained that it was large enough to hold 200 persons. A gallery leading from this hall could not be entered, as it was filled with deadly gas. The second entrance to this cavern leads to a nearly square room about 170 feet in length and width, and eleven feet high. This gallery is well ventilated, having fissures in the ceiling which admit the air. But the cavern is not used as a place of habitation.

Railroad on the Upper Congo.—The Government of the Congo Free State has decided to build about 800 miles of railroad from Stanleyville (formerly Stanley Falls), so as to unite the Congo by steam both with the Nile and with Lake Tanganyika. Engineers have been engaged for about two years in making surveys for the projected railroad to the Nile at its outlet from Albert Nyanza. The line will extend through the forest region direct to the extreme north of Lake Albert at Mahagi. It will be about 450 miles in length.

The second line will be divided into sections connecting navigable stretches of the Congo above Stanleyville. The first section will skirt the rapids for 120 miles, as far as Ponthierville, whence communications will be continued by water for 240 miles to the cataract below Nyangwe. The rapids will be doubled by a second section to the navigable reach above Nyangwe. The third section of the road will connect the upper Congo with Lake Tanganyika. It was decided from the first that these great improvements should permanently be the property of the State.

The Telegraph in Central Africa.—Mr. Mohun, formerly the American Consul at Loanda, West Africa, was engaged by the Congo Free State in 1898 to establish a telegraph line between Lake Tanganyika and the Congo River. He has completed the work and returned to Belgium. His wire and equipment were carried by steamboat, porters, and wagons from the mouth of the Zambesi to Lake Tanganyika, where he began the erection of the line at Sungula, extending it west along the caravan route to New Kasongo, on the upper Congo. He says that New Kasongo has become one of the most important trading points in Central Africa. It is visited by thousands of natives, Arabs and a few Europeans, who come to this centre to sell and to buy. Merchants of Zanzibar send cara-

vans with foreign commodities to this place, and all the country around it for twenty days' journey is commercially tributary to the town (*Mouve. Géog.*, 1901, No. 45).

NAVIGATION ON THE NIGER.—*La Revue Française de l'Etranger et des Colonies* (1901, p. 370) says that the Lenfant Mission has arrived at Say, on the upper Niger, with freight carried up the river from the sea. This is the first time that the Niger has been used for freight carriage from the ocean far into the interior, it being supposed that the difficulty of navigation through the rapids would render such service impossible. Captain Lenfant was instructed to occupy the regions between the Niger and Lake Chad which were transferred to France by the Franco-English Convention of 1898. Navigation on the lower Niger, though in British territory, is free to all nations, and the French accordingly desired to ascertain whether they might utilize this all-water route to the far interior. Lenfant had no special difficulty in ascending the river to Badjibo in lighters with 8,000 cases of food and other supplies. He ascended the rapids above Badjibo in April and May last with sixty tons of merchandise in fifteen wooden lighters. The river being low, it was a very unfavourable time for passing the rapids, and the difficulties were formidable, progress being possible only by hauling on tow-lines fastened to rocks ahead. The enterprise, however, was successfully carried out. It is believed that the experience now gained will lessen the difficulties of further attempts to navigate these waters, and that the economic value of this route to the new French territory will be important. Captain Lenfant proposed to make a second ascent in August, at high water, when he expected that an easier passage might be made.

A SUBTERRANEAN NILE.—The depression of the Oued-Rhir, in the Algerian Sahara, directly south of the Auras Mountains, may be called a channel in a plateau of limestone and sandstone, running north and south, and bordered by escarpments about twelve miles apart at the edges of the plateau. The depression, about ninety-three miles in length, is fertilized by a subterranean Nile, turning the desert into a garden. It is the most important oasis in the Algerian Sahara, its verdant aspect being in striking contrast with the whitish waste of the plateau around it. The chief settlement in this depression is Tugurt, and around it are nearly 200,000 date-palms. Nearly all of the inhabitants are of the Ruara tribe, an industrious people, well-sinkers and date-growers. To the north are the Atlas ranges of Algeria, the effective barrier that prevents

Mediterranean rains from reaching this region. The only sources of humidity are dew and the rain and snow that fall on the wide mass of the Auras Mountains. These waters disappear in the sandy soil on the southern slope of the mountains, and this is the origin of the unfailing supply of water that underlies the depression of the Oued-Rhir. The depth at which the water is found varies with the distance below the surface of the impermeable stratum on which it flows. The natives have for ages sought to make this underground resource available; but with their rudimentary methods they were able to reach it only when the superficial strata were neither too thick nor too hard.

In 1856, Col. Desvaux began to tap this water source by boring, and the results conferred great blessings upon the whole district. Between 1857 and 1896, 777 artesian wells, 320 of which are spouting wells, became sources of life to the surrounding lands. The combination of water and sun developed the great date-raising industry of the Oued-Rhir, which is now one of the most productive parts of Algeria.

EUROPE.

INTERIOR NAVIGATION IN GERMANY.—*La Géographie* (NOV., 1891), deriving its information from the diplomatic and consular reports to the French Government, says that the Rhine has to-day the largest traffic of all European rivers. It also carries maritime navigation farthest inland. Cologne has become a seaport like Düsseldorf and Duisburg. The movement of sea vessels on the Rhine is comparatively important. One line of steamers plies from Duisburg and Düsseldorf, in the Rhine-Westphalia industrial district, to the Baltic, importing lumber and exporting coal and iron. A line of three steamers makes regular trips between Ruhrort, Düsseldorf, and Cologne on the Rhine, and London. Another line of eighteen small steamers connects lower Rhine cities with ports on the North Sea and the Baltic as far as Riga, Russia. Another line of four steamers plies between Cologne and St. Petersburg, the same company also having steamers regularly in the trade between Cologne and Palermo. Three steamers are in service between Cologne and Hamburg. The barge trade between Cologne and Baltic ports is also important, seaworthy barges of from 600 to 1000 tons being towed by powerful tugs. Ruhrort, the great coal port of the Ruhr coalfields, with a commercial movement of about 6,000,000 tons a year, is the most active port on the Rhine. No other interior port of Europe has so large a traffic. The commercial move-

ment of the other Rhine ports in 1900 was: Duisburg, with Hochfeld, 5,544,000 tons; Mannheim, 4,704,000 tons, of which 403,000 tons came from the Necker; Ludwigshafen, 1,447,000 tons; Mayence, with Gustavsburg, 1,131,000 tons; Frankfort-on-the-Maine (which may be considered a Rhine port), 1,687,000 tons; Cologne-Deutz, 1,019,000 tons; Düsseldorf, 619,000 tons; finally, Strassburg, 609,000 tons.

The Elbe comes next after the Rhine. The traffic of 1900 between Hamburg and the upper river amounted to 5,440,000 tons. On the Oder the city of Breslau is the most active port, with 1,313,000 tons local traffic and 996,700 tons transit trade. The canal between the Spree and the Oder carried 1,679,000 tons of freight. The movement on the Swine river amounted to 508,000 tons.

During the year 1899–1900 the Kaiser Wilhelm Canal was navigated by 26,279 vessels of 3,488,767 tons. This is an increase of 463 vessels and 370,927 tons over the preceding year.

Surveying the British Lakes.—Dr. H. R. Mill, in his presidential address to the geographical section of the British Association at Glasgow, announced that Sir John Murray and Mr. Laurence Pullar had decided to complete the bathymetrical survey of all the fresh-water lakes of the British Islands. Mr. Pullar has made over to trustees a sum of money sufficient to enable investigation to be commenced at once and to be carried through in a comprehensive and thorough manner. All the lakes will be sounded and mapped as a preliminary to complete limnological investigation. The nature of the deposits, the chemical composition of water and its dissolved gases, the rainfall of the drainage areas, the volume of the inflowing and outflowing streams, the fluctuations in the level of the surface, the seasonal changes of temperature, and the nature and distribution of aquatic plants and animals will all receive attention (*The Geog. Jour.*, Oct., 1901).

The German Colonial School.—This institution, established two years ago at Witzenhausen to fit young men for responsible positions in the Colonies, has thus far sent twenty-five of its pupils to East Africa, South Africa, the Cameroons, Togoland, and other tropical regions. During the last term the school had forty-six pupils. The theoretical instruction includes colonial government, commerce and communications, chemistry, geology, zoology, tropical hygiene, and tropical agriculture. The practical instruction includes work in the field, shop, and laboratory relating to

agriculture, gardening, chemistry, wood and stone working, blacksmithing and carpentry. A model farm of 425 acres is part of the school property. This school is one of the agencies that are contributing to the intelligent development of the German colonies. Others are the experimental stations maintained by the Government in East and West Africa and New Guinea; and the coffee, cotton, tobacco, and other plantations which are being opened by colonial societies in the foreign possessions.

SOUTH AMERICA.

PROGRESS ON THE TAPAJOS RIVER, BRAZIL.—The Tapajos, the third largest southern affluent of the Amazon, is still imperfectly known. Navigation is confined to the lower section. Unless railroads are built around the cataracts, the Tapajos can never become a means of communication between the Amazon and the far interior. There is a fortnightly steamboat service from Pará, and two or three trips a month are made by a steamer from Santarem, at the mouth of the river, to the first cataract, a distance of 230 miles. Commerce is developing, especially in rubber. New settlements have been founded, which as yet are indicated on only a few of the best maps, while towns still shown on the maps have disappeared. Itaituba, on the middle river, seems destined to be the largest settlement. It lies in the centre of a region that is very rich in rubber, and its commercial importance is already larger than that of Santarem. In the region to the south many settlements have sprung up in the past few years whose inhabitants devote themselves to the rubber industry.

AUSTRALIA AND NEW CALEDONIA.

SUBTERRANEAN LAKES IN AUSTRALIA.—Natives in the service of Mr. G. B. Scott have discovered subterranean lakes in the Eucla district, north of the great Australian Bight. The *Scottish Geographical Magazine* (Nov., 1901) says these lakes are sixteen miles west of those discovered by Mr. Juncker. They contain an apparently unlimited supply of good drinking water at a depth of thirty feet from the surface, and in country providing good indigenous bush feed for cattle. This fresh discovery emphasizes the possibility of revolutionary development in Central Australia, which may yet make feasible an amount of inland settlement of which we have not previously conceived in that drought-stricken area. The discovery also casts some light upon the problem of what becomes of the

Central Australian waters not lost by evaporation and of the rivers which disappear so provokingly. The solution of this problem would probably go far to settle the question of utilizing the country, whose only lack is water.

A RAILROAD IN NEW CALEDONIA.—The first railroad in the smaller islands of the Pacific, except in Hawaii, is now building in the French colony of New Caledonia, the work beginning on August 17th last. The road will skirt the west coast, connecting Noumea, the capital, with Bourail, the most important agricultural centre of the island. The governor of the colony, M. Feillet, says that the railroad, which will be about ninety miles long, will make it much easier to develop the cobalt, nickel, and other rich mineral resources, and that Indian coolies will be imported to augment the labour needed in the mines. The Nickel Company proposes to extend the railroad further north to Koné.

POLAR REGIONS.

SOME UNEASINESS is felt in Norway with regard to Capt. Sverdrup's party in the *Fram*, and it has been proposed to send an expedition to the East Greenland Coast in search of the missing ship.

The *Fram* was provisioned for five years—a fact which seems to have been overlooked in noting Capt. Sverdrup's failure to establish caches along the line of his route, so far as known—and there seems to be little reason to fear disaster to so staunch a vessel, commanded by the able seaman who carried her through all the perils of her first three years in the frozen seas of the North.

IT IS ANNOUNCED that a Norwegian expedition, under the command of Mr. Amundsen, one of the party on board the *Belgica*, will be sent to determine the position of the north magnetic pole.

THE RUSSIAN-SWEDISH measurement of an arc of the meridian in Spitsbergen is still unfinished. *Petermanns Mitteilungen*, 47 Band, IX, reports that the Russian party had succeeded in determining all the points of triangulation, but that the Swedish division had been hindered by the ice and had been unable to complete its work, which must be taken up again in 1902, if, as is to be expected, the Diet makes the necessary appropriation.

Mr. W. S. Bruce writes in the *Scottish Geographical Magazine*, for November, that he has been successful in raising sufficient funds for one complete year's work in Antarctic exploration, and that the Scottish Antarctic Expedition will leave Scotland in the autumn of 1902. This delay he looks upon as a decided gain, since it allows time for thorough preparation and for special training.

One change will be made in the plan: there will be no winter station established. Mr. Bruce's opinion is that the greatest present need is a free-moving ship constantly doing work on the *Challenger-Valdivia* lines for a whole year. If the ice conditions are favourable, the ship will push as far southwards as is prudent; but in no case is it Mr. Bruce's intention to allow the ship to be caught in the ice. The expression is emphatic; but the ice has been known to take no note of intentions.

Field Ice near Cape Horn.—The sugar-laden bark *Nuuanu*, which left Honolulu in June and arrived at Philadelphia early in November, was caught in field ice in September while rounding Cape Horn. The ice extended as far as could be seen to the south, with fair weather and a smooth sea.

BOOK NOTICES.

The Harriman Alaska Expedition, Edited by C. Hart Merriam, 2 Vols. 383 pp., illustrated, Doubleday, Page & Co.

This is easily the most beautiful geographical work of the year, if not of many years. The text is printed on large paper, and is accompanied by 39 exquisite coloured plates, 85 photogravure plates, 240 figures in the text, and 5 maps. The subjects of the pictures in colour are landscapes, birds, mammals, and flowers. Most of the illustrations are from photographs by members of the expedition; about 5,000 were taken. There is a preface by Mr. Edward H. Harriman, patron of the expedition, and this is followed by an introduction by Dr. Merriam.

The expedition was planned as a summer cruise for family and friends in 1899. It was extended to take in a large group of scientific observers, and route and plans were fully accommodated to their needs and studies. A specially-chartered ship conveyed the party, with an outfit of naphtha launches, a library, and every convenience for work. In addition to the scientific party, a number of artists, taxidermists, photographers, and stenographers accompanied the expedition. Organization was effected into a large number of special committees, for plans, lectures, and various departments of scientific observation. Several members of the party will be named in connection with chapters contributed by them to these volumes. Among others were F. V. Coville, Curator of the National Herbarium, Professor B. K. Emerson of Amherst College, and Mr. G. K. Gilbert of the United States Geological Survey. The plans were carried out with the co-operation of the Washington Academy of Science, and a large amount of data and considerable collections were gathered, which will form the basis of a series of technical publications. These later volumes will deal with geology, paleontology, zoölogy, and botany.

The narrative of the cruise is by John Burroughs, and occupies 118 pages. The voyage began at Seattle and followed the inside route, with frequent landings, including a railway trip over the new line to White Pass. Glacier Bay was visited, then Sitka, Yakutat Bay, Cook Inlet, and Kadiak Island. Thence the course followed the Alaska peninsula to Unalaska, and turned northward through Bering Sea to Plover Bay, on the shore of Siberia. The

return was made by Port Clarence on the Alaskan side, thence following nearly the outgoing route to Seattle.

A short chapter by John Muir describes, or rather enumerates, many of the ice streams. The interesting fact appears that since the author's first visit in 1879 some of the trunk glaciers about Glacier Bay have receded beyond the points of confluence of their tributary streams, thus increasing the number of separate glaciers. Several new glaciers were found in a fine inlet, now discovered for the first time, and named, appropriately, the Harriman Fiord. This is a really significant addition to the map of Alaska.

Mr. George Bird Grinnell contributes a paper on the Natives of the Alaska Coast Region. The Alaska Indians are characterized as a hardy race, being good mountaineers and brave mariners. Their chief food is salmon, and in their canoes, hollowed from a single log, they are at home on the sea. They build substantial villages, and the totem poles and other forms of native art are quite fully illustrated. The first Eskimo were seen at Prince William Sound, and the Aleuts at Shumagin Islands.

Volume II opens with the Discovery and Exploration of Alaska, by William Healey Dall, well known as an authority on that region. He marks the first period as including visits of Cossacks, and of the Bering expeditions, down to 1799. Then the Russian-American Company was chartered and held sway until 1867, when a third period opens with the ownership of the United States. A fourth era begins in 1895 with the development of the Klondike goldfields. The first accurate description of the coast is ascribed to Cook, who visited the region in 1778. Transfer to American jurisdiction was not at first an unmixed blessing, for conditions approaching anarchy long prevailed. The work done by the Coast Survey, the Geological Survey, and by other Government organizations is far larger than is commonly known, and a bibliography of 4,000 titles upon that region is far from complete.

A splendidly-illustrated chapter on the Birds is from the pen of Mr. Charles A. Keeler of San Francisco. The Forests are described by Dr. B. E. Fernow. A review of his paper will be found in Notes on American Forests and Forestry, on another page of this BULLETIN.

The general geography is treated by Mr. Henry Gannett. The extent of the country is enormous, though but half realized. The coast is heavily glaciated and deeply fiorded. Two young islands appear in Bering Sea—Grewinck being only 17 years old, and Bogoslof 104 years old. Both are volcanic, and a special chapter is

devoted to the latter. The mean annual temperature of the Pacific Coast belt of Alaska is 54° to 60°. It is about that of Eastport, Me., but differs in being cooler in summer and warmer in winter. Owing to prevailing dampness, it is a "chilly" climate. The rainfall at Sitka is 105 inches. In Bering Sea fog is the normal condition. The Aleutian Islands shut out the warm Pacific waters, and sailing is uncertain. The interior of Alaska has a high range of temperature, 147° being recorded; while, as would be expected, the range at Sitka is much less, 90°. At the same time the interior is dry, and has more sunshine in a month than Sitka has in a year. The population in 1900 was 63,592, having nearly doubled in the previous ten years. Mr. Gannett's adjective for the resources of Alaska is—"enormous." In placer gold $5,000,000 came from Cape Nome in the summer of 1900. Agriculture, however, is not promising in Alaska. A most appreciative word is uttered for the scenery, whose "grandeur is more valuable than the gold or the fish or the timber, for it will never be exhausted."

The chapter on the Alaska Atmosphere is by Professor William H. Brewer of Yale University, and deals chiefly with the colours of the sky. Other papers are: Bogoslof, Our Newest Volcano, by Dr. Merriam; the Salmon Industry, by Mr. Grinnell; and Fox Farming, by M. L. Washburn. Mr. Gilbert contributes a note on the Physical History of Bogoslof.

A. P. B.

Aus den Hochregionen des Kaukasus. Wanderungen, Erlebnisse, Beobachtungen von Gottfried Merzbacher. Erster Band. Mit 144 Abbildungen nach Photographien gezeichnet von E. T. Compton, Ernst Platz und M. Z. Diemer, und zwei Karten. Zweiter Band. Mit 102 Abbildungen nach Photographien gezeichnet von E. T. Compton, Ernst Platz, M. Z. Diemer und R. Reschreiter und einer Karte. Leipzig, Verlag von Duncker & Humblot. 1901.

The magnitude of this work is oppressive. The first volume contains 957, the second 963 closely-printed octavo pages, including an index of 117 pages, thoroughly well done, like the rest of the work. It is impossible to review such a book; nor is it a book to be read. It is rather an encyclopædia to be consulted as an authority.

Mr. Merzbacher devotes his first chapter to the orography and structure of the Higher Caucasus. In the centre the axis of the chain is composed of crystalline rocks, granite, gneiss, and granu-

lite; to the west, of porphyry, diabase, and gneiss, and along the axis are deposited the oldest sediments, by which it is completely covered in the eastern part of the chain.

In the Caucasus the snow-limit is lower on the southern slope than on the northern, a point of resemblance with the Himalayas. The contrary is the case with the Alps. Erroneous impressions have prevailed with many as to the poverty of the Caucasus in glaciers.* It is, in fact, not less rich in glaciers than the Alps.

The hydrography is simple. There are no such rivers as in the Alps, but on the two slopes flow two large streams parallel with the direction of the chain, and the water-shed between the two seas, to the south and to the north, is also a climatic dividing wall.

The passes of the Caucasus are all at a great elevation. Mr. Merzbacher gives a list of 68, many of them occupied by glaciers. The lowest pass is Psegaschka, 6,880 feet high, in the west; the highest is Dychni-ausch, 12,720 feet, in the central chain. The famous Dariel pass is 7,800 feet in height.

Mr. Merzbacher climbed many of the peaks, with the ardour of a professed Alpinist; but he was interested in men not less than in rocks and walls of ice, and his chapters on the mountain peoples have a special value.

The illustrations are charming and in every way worthy of a text in which nothing is wasted.

The map (in three sheets) is based upon the surveys by the General Staff of the Army of the Caucasus.

Publications of the Museu Paraense de Historia Natural e Ethnographia.

These publications just received are:

ARBORETUM AMAZONICUM, 1ª e 2ª Decadas, the Iconography of the most important Plants growing spontaneously and cultivated in the Amazonian Region, by Dr. J. Huber, Chief of the Botanic Section of the Museum. These present twenty quarto plates, beautifully printed, with brief descriptions in Portuguese and French;

ALBUM DE AVES AMAZONICAS, 1° Fasciculo, Estampas 1–12, by Dr. Emilio A. Goeldi, Director of the Museum. These twelve plates, somewhat smaller than those of the *Arboretum*, show the birds with their colouring among the trees and on the shores, as they live.

*Among those who have committed themselves to error on this subject are named Heim, Agassiz, Salatzky, and *Réclus*; so printed, even in the index.

The native or Portuguese name is given in every case with the scientific name;

MEMORIAS DO MUSEU PARAENSE.

I.—Excavações archeologicas em 1895—1ª Parte: Artificial Funerary Caverns of Indians now extinct on the River Cunany, and their Ceramics, by Dr. Emilio A. Goeldi. The four plates accompanying the text were made in the Museum. One shows sections of the site of the excavations and of one of the caverns; the other three give coloured reproductions of pottery found in the caves.

II.—Zwischen Ocean und Guamá. A Contribution to the Knowledge of the State of Pará by Dr. K. von Kraatz-Koschlau and Dr. Jacques Huber. With a map (of the northeastern part of the State) and ten plates.

It would not be easy to improve upon these strikingly handsome publications.

M. FROIDEVAUX'S PARIS LETTER.

PARIS, November 21, 1901.

Having sketched in previous letters the history and the present organization of the Geographical Service of the Army, we have now to mention the works already accomplished and those now in progress under this active and important institution; so far, that is to say, as relates to the maps furnished to the public, and omitting entirely those known as *special*, which are executed for the particular requirements of the army.

Much the best-known work published by the Geographical Service is the map of France on the scale of 1:80,000, commonly known as the Map of the General Staff. Prescribed by royal order of August 6, 1817, to replace the Cassini map, which had become inadequate, the new map was begun April 1, 1818; the topographical work was completed in 1866 and the engraving not until 1882. The map comprises 273 sheets; it is periodically revised on the ground, and has been constantly kept up to date since 1889 by the Geographical Service.

To facilitate consultation and the handling of the map, the great sheets of 80 by 50 centimetres have been divided into quarter-sheets (40 by 25 centim.). This transformation was effected in the years 1889–1898, and he who wishes to possess a complete representation of France in this 1889 type must purchase 965 quarter-sheets, some of which are full, while others cover a part of the frontier.

It would be interesting to devote a few pages to the curious history of the map on the scale of 1:80,000, and I may be able to do this at a later day. For the present it will suffice to note that, the insufficiency of the map having been recognized by the Central Commission on Geographic Work, the Geographical Service of the Army began in 1897 an amplification on a scale of 1:50,000; a mere enlargement of the other, but none the less useful, and a provisional solution, waiting upon the decision of the Parliament in favour of a map on a large scale, the necessity of which becomes more and more marked, and the appropriation of the funds for the enterprise.

By the side of this enlarged map, work upon which proceeds only in the absence of more pressing duties, the Geographical Service possesses several reductions of the same map, each offering its own interest. One is the chorographical map of France on a scale

of 1:200,000, in 82 sheets, giving the position of administrative centres, including the communes, the hamlets, the remarkable places, the roads fit for vehicles at all times and those irregularly kept, when they are of importance to be known. Another is the map on a scale of 1:320,000, in 33 sheets, a veritable communal map of the country, which shows only the principal routes of communication and the administrative centres down to the chief places of the communes. In this the surface forms have been generalised so as to be in accord with the scale. Finally, there is the map of French railways, on a scale of 1:800,000 (in 4 sheets), which has taken the place since 1895 of the one at 1:1,250,000, become unserviceable by reason of the increasingly complicated network of lines. This map is made to keep pace with the opening of new roads.

The details relating to each one of these maps published by the Geographical Service of the Army will be found in the remarkable historical work on the *Carte de France de 1750 à 1898*, published three years ago by Col. Berthaut, head of the Cartographical Section. Nor does the Geographical Service confine itself to the study and the cartographical representation of the mother country; its activity extends to the French colonies, and, thanks to it, our territories of north-western Africa are already provided with a number of excellent topographical maps. First may be named the Topographical Map of Algeria, on a scale of 1:50,000. The first sheets appeared in 1884, and about 150 are now on sale, each measuring 64 x 40 centimetres. Next comes the Chorographical Map of Algeria, on a scale of 1:200,000, similar in design to the Map of France, on the same scale. Thirty sheets of this have been brought out since 1890. Lastly, there are six sheets of a Map of Algeria, on a scale of 1:800,000, which, based at first upon the itineraries of the expeditionary columns, was completely reconstructed in 1893, and is now established in great part upon regular surveys. It is kept up in accordance with the latest topographical work, and forms the basis of a march Map of Algeria, also on the scale of 1:800,000.

There are corresponding maps for Tunisia, the two countries belonging to the same natural region, and the Tunisian map being a natural prolongation of the Algerian.

Between 1882 and 1887 there was made, on a scale of 1:200,000, a map to answer the first requirements of the French occupation; but, with the progress of colonisation, this soon became insufficient, and in 1888, by an agreement between the French Government and that of the Bey, the Geographical Service was charged with the execution of the regular map of the Regency, on a scale of 1:40,000,

publication to be made on the scale of 1:50,000. To secure greater rapidity of execution a new agreement in 1895 limited the surveys for the 1:40,000 to the north of Tunisia, the Sahel and the environs of certain cities (Kef, Sfax, Gafsa, Gabes, and Ksar Medenin); the rest of the territory to be on the 1:80,000, and for publication on 1:100,000. The operations on the ground are now carried on simultaneously on the two scales of 1:40,000 and 1:80,000; more than 50 sheets at 1:50,000 are surveyed or finished and on sale; but the publication of the map at 1:100,000 has only just begun. In fact, the map of Tunisia, on the scale of 1:800,000 (the prolongation of the Algerian on the same scale), is the only one up to the present date; it is a reduction of the provisional map at 1:200,000 and of the regular surveys made since 1888, and it is regularly corrected by the most recent topographical operations.

Another work which does great honour to the Geographical Service of the Army is the map of Africa, on the scale of 1:2,000,000, in 63 sheets, drawn in 1875–1890 by the *Chef de bataillon* of Engineers de Lannoy de Bissy, and continued since 1891 by Capt. Rouby. Based on the information contained in geographical collections and in the reports of travel, this map is the result of comparison and co-ordination of the maps on different scales made to show the explorations, as well as of manuscript and unpublished originals, and it is constantly corrected and kept up in accordance with new discoveries.

Of many other important maps in process of execution by the Geographical Service on the uniform scale of 1:1,000,000 may be mentioned those of Asiatic Turkey (in 12 sheets), of Asia (the sheets of the Gulf of Pechili, Korea, and part of Japan), and of America (the first twelve sheets relate to a portion of the Antilles, the scene of the principal events of the Spanish-American War). We shall undoubtedly have to return at a later period to some of these productions, conceived on the same plan.

So far as relates to the doings of our travellers or precise information concerning their scientific work, the past two months are somewhat scantily furnished.

Nothing very certain is known of the explorations in progress, and most of the information received concerns expeditions already terminated. For instance, M. A. Chevalier, known for his interesting botanical explorations in the French Sudan, has communicated to the Academy of Sciences certain curious facts which seem to point to the recent immersion of the Sahara (the presence in the neighbourhood of Timbuktu of *Marginella Egouen* and *Columbella*

mercatoria, essentially marine forms still living on the coast of Senegambia). These are facts to be associated with the presence of a fossil sea-urchin at Zau Saghaïr,* and they call attention to a much-disputed question, which further discoveries will no doubt enable us to answer.

Capt. Lenfant, commanding the flotilla on the Lower Niger, has sent to the Société de Géographie precise information concerning the freshets of the river and the geology of the districts which he has visited, and M. Georges Thomann, Assistant Administrator of the Colonies, has furnished in the *Bulletin* of the Comité de l'Afrique Française an account, less clear than it might be, but really new, of the Sassandra, on the Ivory Coast. In Equatorial Africa the reconnaissances of Messrs. Bobichon and Superville have extended the domain of geography, and the latter, in his exploration of the Kotto, has shown that the conditions of this river are analogous to those of the Mbomu, and that it may be navigated without danger, even at the stage of low water. In the same region Lieut. Bos, Administrator of the circle of N'Sakkara, has executed an interesting itinerary and surveyed more than 1350 kilometres, a good part of it in unknown territory. With the *Bulletin's* information concerning the countries visited by these two travellers may be compared the excellent studies of Dr. Cureau on the Zandé plateaux. His two articles in the *Revue générale des Sciences Pures et Appliquées* are, in fact, a commentary on his fine map published in 1900 (15 Oct.) in *La Géographie*. It is also in *La Géographie* that Lieut. A. H. Dyé has begun to publish the list of geographical positions in Central Africa astronomically determined by the Marchand Mission.

Attention may be called to Capt. Lemaire's memoir on the Grottoes and the Troglodytes of the Katanga.†

Another interesting publication in the October number of *La Géographie* is the map of M. Hugues Le Roux's itinerary from Addis-Abeba to the Blue Nile by way of the Wallaga country. Menelik, King of Kings, certifies in an official document that M. Hugues Le Roux is the first European to behold the confluence of the Abai Nile with the Didessa. Extracts from the explorer's note-book form a commentary on the map, which is drawn by M. V. Huot on a scale of 1 : 1,000,000.

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*It is essential to correct an error on p. 286 of the BULLETIN. Col. Monteil found at Zau Saghaïr not a fossil bear, but a sea-urchin; a mistake made in reading the French word *ourson* for *oursin*.

† Noticed in the GEOGRAPHICAL RECORD.

A recent mail from Madagascar brings news of a journey performed by M. Guillaume Grandidier in the south of the island, from Fort Dauphin to Tuléar * by Tsiombé, on the Manambovo, to Faux Cap and Cape St. Mary. From Tuléar the young traveller made his way by land to Lake Tsimanampetsotsa, discovered in 1868 by M. Alfred Grandidier, and completed its circuit. Thence he pushed as far to the north as the Mangoka, and he proposes, after making palæontological researches at various points, to return to Fort Dauphin by crossing the southern part of the island by a different route. It may be affirmed that this journey is rich in new information and in important corrections, passing, as the explorer did, through a country imperfectly known, and in some places even totally unknown. He brings back, besides valuable collections of natural history, a map of his route on a scale of 1:200,000. Other contributions to a more exact knowledge of southern Madagascar are found in the monographs brought out by the *Revue de Madagascar*, the periodical which now receives the articles formerly issued in the quarterly *Notes, Reconnaissances et Explorations*, now no longer published. A paper to be read is the excellent General Considerations on the Climatology of the Fort Dauphin District by Dr. Decorse, who resides there, and is well acquainted with the region.

Among the most important books published in the last two months must be counted the *Comptes Rendus* of the Eighth Session of the International Geological Congress; the two parts containing not less than 1314 pages of text and 22 separate plates. Most of the articles, naturally, are on geological subjects, such as palæontological stratigraphy, petrography, etc.; but others have interest and value for geographers. Among these memoirs, accompanied by new maps, are the Geological Sketch of the Sinaïtic Peninsula, by Mr. W. F. Hume; maps of the Desert in Eastern Egypt, by Messrs. Barron and Hume; the map of the Principal Depressions or Oases of the Libyan Desert, by Mr. H. J. L. Beadnell; and a Geological Sketch of Madagascar, by M. Marcelin Boule, on a scale of 1:6,000,000. The volumes abound in facts; it is only to be regretted that some communications (that of M. G. B. M. Flamand, on the Geology of Southern Algeria, and that of M. Arctowski, on the Glaciers and the Geology of the Lands discovered by the Belgian Antarctic Expedition) are so briefly summarised, and that the account of the numerous excursions, thirty-five and more, organized in France by the Committee, is made so short. It is true that the remarkable guide-book, published before the Congress under the title of

* The official spelling is *Tulléar*.

Guide Géologique de la France, furnishes for most of the places visited by members of the Congress very precious information, and constitutes a working instrument of the first order for geographers as well as for geologists; none the less, it might have been well to give more extended notices of the discussions which took place on the spot. In this way the report on the excursions would have formed a very useful complement of the guide-book itself.

One of the points visited during the Congress of 1900 was the Quaternary volcano of Gravenoire, with its cone in the form of a cupola covered with pines and beeches, and rising about two miles to the south-west of Clermont-Ferrand, more than 1300 feet above the Limagne. An excellent monograph on this volcano, by M. Glangeaud, appears in the *Bulletin des Services de la Carte Géologique de la France*. M. Glangeaud has proved that the volcano was situated on a fault (the western fault of the Limagne), which brought the Tertiary strata of the Limagne against the crystalline rocks that constitute the base of the chain of the Puys, and that the smaller volcanoes in the neighbourhood of Beaumont were established on parallel faults. Between these volcanoes and those in Iceland, described by von Keilhack and Thoroddsen, M. Glangeaud has noted very interesting points of comparison.

M. Marcel Monnier is not only a tourist who knows how to observe and to describe countries and peoples. His surveys of routes made during his travels in Asia, in the years 1895–1898, possess such merit that the Société de Géographie, with the aid of the Ministry of Public Instruction, has undertaken to publish them, and there has just appeared, under the title of *Itinéraires à travers l'Asie*, an atlas of 28 plates, drawn by M. J. Hansen from M. Monnier's surveys with the compass. Nineteen of these plates, on a a scale of 1:150,000, relate to Korea and China; the others, on a scale of 1:750,000, show the traveller's route across Mongolia, the Altai, the Kirghiz steppe, Turkistan, Persia, and Asia Minor. A volume of substantial notices, illustrated by excellent photographs, adds to the interest of this fine publication, in which M. Marcel Monnier appears under a different aspect from that familiar to readers of the first two volumes of the *Tour de l'Asie*.

Few books are brought out between the vacation and the New Year, and only one calls for mention in this place: M. Henri Vignaud's work, *La Lettre et La Carte de Toscanelli sur la route des Indes par l'Ouest*. In this the author takes up and develops the theory which he put forward last year at the XIIth Session of the International Congress of Americanists. To him everything wears

a dubious aspect in the supposed correspondence of Toscanelli with Fernam Martins at first, and afterwards with Christopher Columbus. Bartholomew Columbus seems to have been the author of an imposition, by which the Admiral never profited, nor tried to profit; and the real prime mover in the discovery of America would appear to be not the celebrated Florentine astronomer, but a poor seaman who died in obscurity without leaving even a name to posterity. These are M. Vignaud's principal conclusions. His work will soon appear in English, and he announces that he will before long take up, in a work on the Precursors of Bartholomew Diaz and Christopher Columbus, the history of Alonso Sanchez, of Huelva, who was, perhaps, the unknown pilot that instructed Columbus. It must be admitted, in any case, that the thesis is very alluring, and that M. Vignaud's book, which is solidly constructed and fortified with documents, contains rectifications and information which the historians of geography and of Columbus must henceforth take into account.

Mention must be made, in closing, of the last annual Geographical Bibliography published by the *Annales de Géographie*. In this excellent bibliography, which is under the charge of M. Louis Raveneau, the best geographical productions of the preceding year are classified and succinctly analyzed. This tenth issue, covering the year 1900, is particularly interesting, because it registers the most important geographical books and articles called out by the Universal Exposition, and is, therefore, of equal utility with the solid and noteworthy articles of Messrs. de Margerie and Raveneau on Cartography at the Universal Exposition of 1900.

HENRI FROIDEVAUX.

OBITUARY.

Clarence King.

Mr. King died at Phœnix, Arizona, December 24, 1901, in his sixtieth year.

He was born at Newport, Rhode Island, and he received his education at Hartford, Connecticut, and at the Sheffield Scientific School of Yale University, from which he was graduated in 1862.

In 1863 he crossed the plains to California, where he served for several years on the State Geological Survey, under Prof. Whitney. Among the peaks of the Sierra Nevada measured by him was the highest of all, and to this it was he who gave the name of Mount Whitney.

In 1867 he was made Geologist in Charge of the U. S. Geological Exploration of the Fortieth Parallel, a work covering the topography, geology, and natural history of the country lying along that parallel of latitude from the eastern slope of the Rocky Mountains to the western slope of the Sierra Nevada. The reports of this exploration fill seven quarto volumes and two atlases, the first volume, on Systematic Geology, being the work of Mr. King. While engaged upon this publication, Mr. King's attention was drawn to the reported discovery of rich diamond deposits in the West. He visited the spot, and soon detected and exposed a fraudulent scheme of great magnitude.

In 1878, Mr. King suggested the consolidation of the various surveys carried on by the Government; and in 1879 the U. S. Geological Survey was established under his directorship. He resigned the office in 1881.

In recent years he began to show symptoms of the disease which has carried him off, it must be felt, before his time.

Mr. King's life was devoted to scientific pursuits, but his intellectual sympathies were not limited by science. His culture was wide in literature and in art, and his one published book, *Mountaineering in the Sierra Nevada*, has a charm of its own.

Mr. King became a Fellow of this Society in 1877, and was elected in the same year to a seat in the Council.

NOTES FROM THE DIVISION OF HYDROGRAPHY.

U. S. GEOLOGICAL SURVEY.

ALASKAN EXPLORATION. — During the past field season the United States Geological Survey has had four parties engaged in exploring Alaska. The first, under Mr. W. J. Peters, assisted by Mr. F. C. Schrader, started from Skagway early in February, and went 1,200 miles with dog team to Bergman, a trading post on the Koyukuk river in central Alaska, near the Arctic Circle, where a cache of canoes and provisions had been made the previous year. The party then penetrated north to the divide of the Yukon, making portages to the headwaters of the Colville river, and descended through an entirely unknown country to the Arctic Ocean. The country from the mountains to the sea was found to be rolling tundra. Owing to the lateness of the season, the party were obliged to skirt the coast to the west in canoes and whale boat in the hope of reaching Cape Nome before the ice set. After working down the coast for 350 miles they were picked up by a collier.

The second party, under Mr. T. G. Gerdine, assisted by Mr. A. J. Collier, penetrated the Seward Peninsula, on which is located Cape Nome, for about 100 miles, and spent the season in completing the exploration, and mapping the western part of the peninsula, north of the Nome mining district, which was surveyed last year.

The third party, under Mr. W. C. Mendenhall, assisted by Mr. D. L. Reaburn, starting from Fort Yukon, surveyed the Yukon river for a distance of about 200 miles down its course, then crossing the divide to Bergman, where use was made of the cache established the year before, penetrated unknown country to the westward, and descended the Kowak river to Kotzebue Sound, an arm of the Arctic Ocean.

The fourth party, under the command of Mr. A. H. Brooks, worked in south-eastern Alaska examining the mineral deposits and exploring the region from Juneau to Skagway. Two months were spent on Prince of Wales Island and the adjacent mainland.

The work of the Geological Survey of the past year practically marks the close of the exploration stage of its activities in Alaska. The districts of which nothing is known are now of less extent than formerly, and henceforth more detailed mapping and examination of the Territory's resources will take the place of the rapid

and often daring reconnaissance trips hitherto necessary. The size and remoteness of the country, the shortness of the field season, the difficulties of travel, and the danger of losing supplies or of being caught by winter, have made the exploration of Alaska comparable to the work of Lewis and Clarke in their early journey across the continent; but in spite of the difficulties, the parties have carried out their work through five seasons without failure or loss of life.

THE U. S. GEOLOGICAL SURVEY has completed the work undertaken in the summer, in co-operation with the Coast and Geodetic Survey, to redetermine the line of the boundary between the United States and Canada, from the crest of the Rocky Mountains to the Pacific Ocean. The line traversed the Rocky Mountains and the Cascade Range and an intermediate hilly country. The trails, once kept open by the Indians, are now greatly obstructed by falling timber, and the surveyors find the easiest routes to be the paths worn by the bears and deer.

IN IDAHO, Prof. Israel C. Russell has discovered an artesian basin over 100 miles in length, with a western limit (not yet determined) in the vicinity of Nampa and Caldwell. The land which can be supplied from this basin lies along the Snake River and in Bruneau Valley.

THE INVESTIGATIONS conducted by Mr. Charles M. Hall, in the valley of the Red River of the North, have revealed two artesian basins underlying a large portion of the upper valley. The more important of the two is the eastern continuation of the Dakota Artesian Basin, with its eastern limit marked by a line running north and south not far from the middle of the Red River Valley, where the water-bearing horizon comes to within 200 feet of the surface. Twenty-five miles to the westward the depth ranges from 400 to 600 feet. The water is found in clear, white sand, and it is much softer than the surface waters.

The second basin lies above the first, at depths ranging from 50 to 150 feet. The water comes from the sand layers at the base of the glacial drift, and is harder than that from the Dakota basin. It supplies hundreds of flowing wells in farms and towns.

A third water horizon lies still nearer the surface.

ACCESSIONS TO THE LIBRARY.

NOVEMBER–DECEMBER, 1901.

BY PURCHASE.

ALLIBONE, S. AUSTIN.—Poetical Quotations, Chaucer to Tennyson. Philadelphia, J. B. Lippincott & Co., 1876. 8vo.

ALLIBONE, S. AUSTIN.—Prose Quotations, Socrates to Macaulay. Philadelphia, J. B. Lippincott & Co., 1876. 8vo.

Almanach de Gotha, 1902. Gotha, Justus Perthes, 1902. 8vo.

ANDERSON, JOHN.—Mission to the East Coast of Sumatra. Edinburgh, W. Blackwood, 1826. 8vo.

BEAUCLERK, C.—Journey to Marocco. London, Poole & Edwards, 1828. 8vo.

BEAZLEY, C. RAYMOND.—The Dawn of Modern Geography, Part II. (A. D. 900–1260). London, J. Murray, 1901. 8vo.

BROWNE, G. F.—Ice-Caves of France and Switzerland. London, Longmans, Green & Co., 1865. 8vo.

BURCKHARDT, J. L.—Notes on the Bedouins and Wahábys. London, H. Colburn & R. Bentley, 1831. 2 vols. 8vo.

BURMEISTER, H.—Reise nach Brasilien. Berlin, Georg Reimer, 1853. 8vo.

CARMICHAEL, MONTGOMERY.—In Tuscany. New York, E. P. Dutton & Co., 1901. 8vo.

CRAWFURD, J.—Descriptive Dictionary of the Indian Islands, and Adjacent Countries. London, Bradbury & Evans, 1856. 8vo.

CUNYNGHAME, ARTHUR.—An Aide-De-Camp's Recollections of Service in China. London, Saunders & Otley, 1844. 2 vols. 8vo.

DARMESTETER, JAMES.—The Mahdi, Past and Present. London, T. Fisher Unwin, 1885. 8vo.

Dictionary of National Biography. Edited by Sidney Lee. Supplement, Vol. 3. London, Smith, Elder & Co., 1901. 8vo.

DRAKE, S. A.—Nooks and Corners of the New England Coast. New York, Harper & Bros., 1876. 8vo.

DUKA, THEODORE.—Life and Works of Alexander Csoma de Körös. London, Trübner & Co., 1885. 8vo.

DWIGHT, H. O.—Constantinople and its Problems. New York, F. H. Revell Co., 1901. 8vo.

ESTRIDGE, H. W.—Six Years in Seychelles. s. l., 1885. 4to.

FITZGERALD, E. A.—The Highest Andes. London, Methuen & Co., 1899. 8vo.

FORBES, C. J. F. S.—British Burma and its People. London, J. Murray, 1878. 8vo.

FOUNTAIN, PAUL.—Great Deserts and Forests of North America. London, Longmans, Green & Co., 1901. 8vo.

FOUREAU, F.—D'Alger au Congo par le Tchad. Paris, Masson & Cie., 1902. 8vo.

GORTON, JOHN—A General Biographical Dictionary with Supplement. London, H. G. Bohn, 1851. 4 vols. 8vo.

GRESWELL, WILLIAM PARR.—Geography of Africa South of the Zambesi. Oxford, Clarendon Press, 1892. 8vo.

HART, A. B. (*Editor*).—American History told by Contemporaries. New York, Macmillan Co., 1900–1901. 4 vols. 8vo.

HEARN, LAFCADIO.—A Japanese Miscellany. Boston, Little, Brown & Co.. 1901. 8vo.

HELMOLT, H. F. (*Editor*).—Weltgeschichte—3. Band, Westasien und Afrika. Leipzig u. Wien, Bibliographisches Institut, 1901. 8vo.

HORTON, GEORGE.—Modern Athens. New York, Charles Scribner's Sons, 1901. 8vo.

HURGRONJE, C. SNOUCK.—Mekka. Haag, M. Nijhoff, 1888–89, 2 vols., 8vo., & Bilder-Atlas, folio.

JEPPE, FRED., & JEPPE, C. F. W.—Map of the Transvaal or S. A. Republic, & Surrounding Territories. Pretoria, 1899. London, Edward Stanford (1901), 6 sheets, 37¼ x 25⅝, in case.

LEWIN, T. H.—Wild Races of South-Eastern India. London, W. H. Allen & Co., 1870. 8vo.

LYNCH, H. F. B.—Armenia, Travels and Studies. London, Longmans, Green & Co., 1901. 2 vols. 8vo.

MAC GUCKIN DE SLANE, BARON (*Translator*).—Ibn Khallikan's Biographiçal Dictionary. Paris, Benjamin Duprat, 1843–1871. 4 vols. 4to.

MAHOMED KAHN, SULTAN (*Editor*).—The Life of Abdur Rahman, Amir of Afghanistan. London, J. Murray, 1900. 8vo.

MARTIN, W. A. P.—The Lore of Cathay. New York, F. H. Revell Co., 1901. 8vo.

MOORE, GEORGE F.—Diary of Ten Years' Eventful Life of an Early Settler in Western Australia. London, M. Walbrook, 1884. 8vo.

MUIR, JOHN.—Our National Parks. Boston & N. Y., Houghton Mifflin & Co., 1901. 8vo.

New York, Manual of the Corporation of the City of. D. T. Valentine. New York, Casper C. Childs, 1847. 16mo.

OLLONE, CAPITAINE D'.—De la Côte d'Ivoire au Soudan et à la Guinée. Paris, Hachette et Cie., 1901. 8vo.

PERY, G. A.—Geographia e Estatistica Geral de Portugal e Colonias. Lisboa, Imprensa Nacional, 1875. 8vo.

PETRIE, W. M. FLINDERS.—Diospolis Parva: The Cemeteries of Abadiyeh and Hu. London, Egypt Exploration Fund, Special extra volume, 1901. 4to.

PETRIE, W. M. FLINDERS.—The Royal Tombs of the Earliest Dynasties, 1901, Part II. Twenty-first Memoir of the Egypt Exploration Fund. London, 1901. 4to.

ST. CLAIR, T. S.—A Residence in the West Indies and America. London, R. Bentley, 1834. 2 vols. 8vo.

SELOUS, PERCY, and BRYDEN, H. A.—Travel and Big Game. London, Bellairs & Co., 1897. 8vo.

SIMPSON, WILLIAM.—Private Journal kept during the Niger Expedition, 1841–42. London, J. F. Shaw, 1843. 8vo.

SWAINSON, C.—A Handbook of Weather Folk-Lore. Edinburgh, Blackwood, 1873. 8vo.

THOMAS, E.—Revenue Resources of the Mughal Empire in India. London, Trübner & Co., 1871. 8vo.

THOMAS, J.—Universal Pronouncing Dictionary of Biography and Mythology. Philadelphia, Lippincott & Co., 1871. 2 vols. 8vo.

TORREY, BRADFORD.—Footing it in Franconia. Boston and New York, Houghton, Mifflin & Co., 1901. 8vo.

TRÜBNER, K. (*Editor*).—Minerva: Jahrbuch der Gelehrten Welt, 1901–1902, XI. Jahrgang. Strassburg, K. J. Trübner, 1902. 8vo.

WELBY, M. S.—'Twixt Sirdar and Menelik. New York, Harper & Bros., 1901. 8vo.

Whitaker's Almanack, 1902. London, J. Whitaker, 1902. 8vo.

Zeitschrift für Allgemeine Erdkunde, Neue Folge, 19 Band. Berlin, D. Reimer, 1865. 8vo.

BY GIFT.

From le R. P. José Algué, S. J., Author :

Relation entre quelques Mouvements Microséismiques et l'Existence, la Position et la Distance des Cyclones à Manille (Philippines). Extrait des Procès-Verbaux et Mémoires du Congrès International de Météorologie (Paris, septembre, 1900).

From the Argentine Government :

Argentine-Chilian Boundary : Report to Tribunal, Parts I–IV; Maps, I–XVI. London, W. Clowes & Sons, 1900. 5 vols. 4to.

From Prof. Emile Chaix, Geneva :

Paul Chaix: 1808–1901 (Extrait du GLOBE, Tome LX, *Bulletin*), Genève, 1901, 8vo; Les Travaux de Paul Chaix, avec une Carte inédite et une Planche (Extrait du GLOBE, Tome LX, *Mémoires*), Genève, 1901, 8vo.

From William Emerson :

Sheet Map : France par Départements et par Provinces. Paris, A. Logerot, 1870, 29½ x 22¼.

From G. Marinelli, Author :

L'Accroissement du Delta du Po au XIX^e^ Siècle. Publication N^o^. 6, Université Nouvelle, Institut Géographique de Bruxelles. Bruxelles, 1901. 8vo.

From Chandler Robbins :

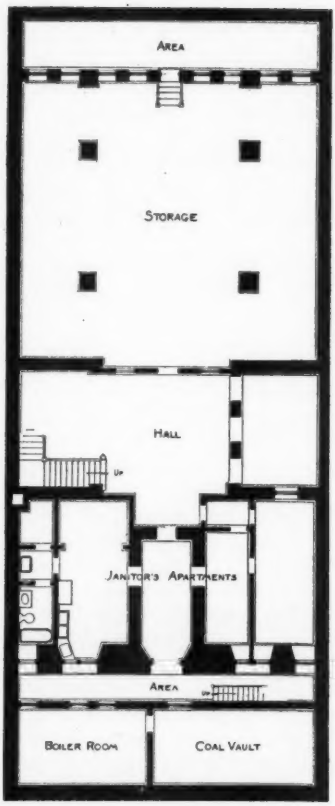
Atlas of maps by N. Visscher, Pieter Goos, and others (no title). s. l., s. a., folio.

From G. Schlegel, Author :

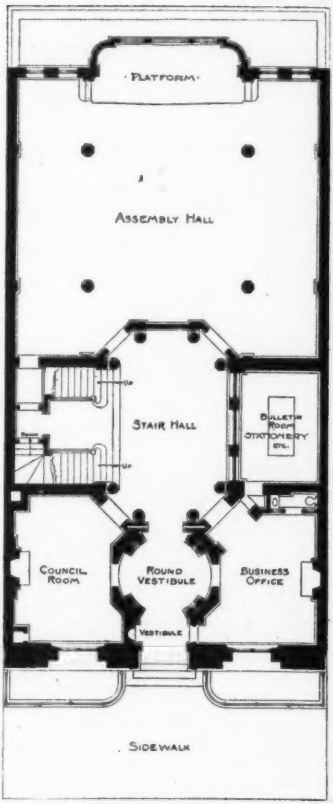
Geographical Notes, XVI. The Old States in the Island of Sumatra. Reprinted from the T'oung Pao, Serie II, Vol. II, 1901.

From La Société pour la Propagation des Langues Étrangères en France :

Congrès des Langues Vivantes. Exposition Universelle, 1900: Une Nouvelle Solution de la Question de la Langue Universelle excluant la Création d'une langue artificielle, Paris (1900), 8vo; Notes sur la Langue internationale, par M. Paul Chappellier, Paris (1901), 8vo.

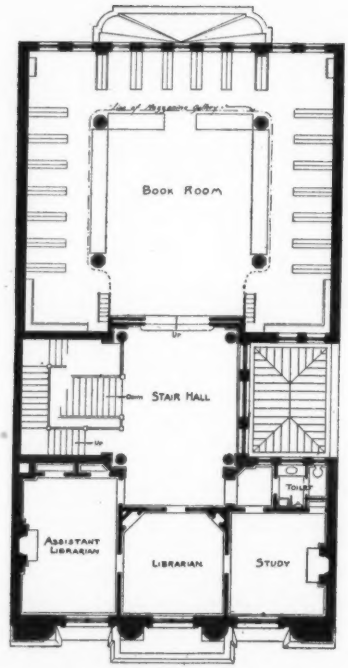


BASEMENT PLAN.

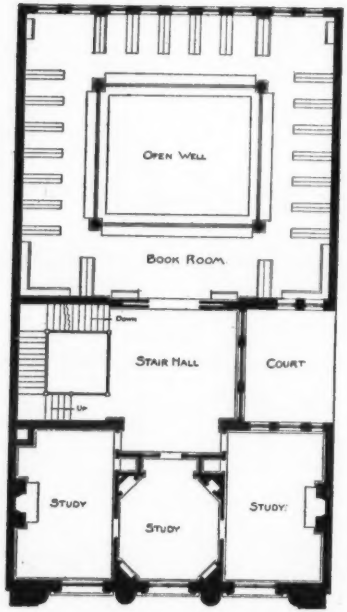


FIRST FLOOR PLAN.

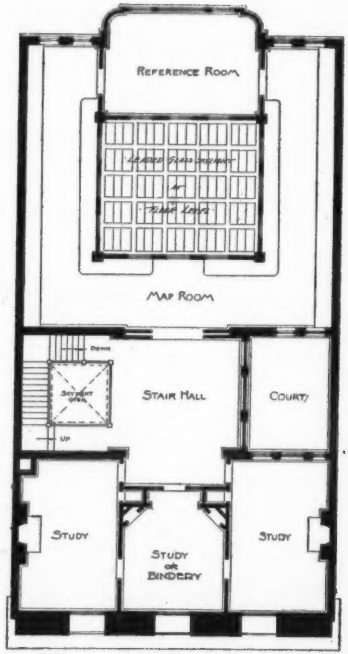
XUM



Second Floor Plan.



Third Floor Plan.



Fourth Floor Plan.

NOTES AND NEWS.

THE SOCIETY is now established in its permanent home at No. 15 West Eighty-first Street, and the accompanying plans show the disposition of space on the five floors of the building. Especial care has been taken to provide for ventilation and the admission of light, and it is hoped that the rooms will be found commodious and comfortable in every respect.

The removal of the books and maps and other collections from the Society's former house has been successfully accomplished, and the rearrangement of the Library and Map-room is proceeding with regularity.

THE ANNUAL MEETING of the Society will be held at Mendelssohn Hall, No. 119 West Fortieth Street, on the 21st of January, 1902, at 8.30 o'clock P.M.

After the presentation of reports, the election of Fellows and other business, Mr. Alden Sampson will address the Society on his visit to Palmyra.

On the 18th of February, Prof. Richard E. Dodge will read a paper on Life Conditions in a Desert, with especial reference to the South-Western United States.

On the 18th of March, M. Hugues Le Roux will describe (in French) his visit to the Emperor Menelik.

IT HAS BEEN DECIDED that the yearly bound volume of the BULLETINS, hitherto issued under the title of *The Journal*, shall hereafter bear the name of THE BULLETIN.

This change of title will not affect the numbering, and the volume for 1901 will take its place in the series as the BULLETIN, Vol. XXXIII. The Index to this volume will be issued with the first number for 1902.

THE THIRTEENTH SESSION of the International Congress of Americanists will be held October 20–25, 1902, in the halls of the American Museum of Natural History in this city.

Those interested in the archæology, ethnology, and early history of the two Americas may become Members of the Congress by signifying their desire to Mr. M. H. Saville, General Secretary of the Commission of Organization (at the Museum), and remitting through him, or to the Treasurer direct, the sum of three dollars.

FOURTH FLOOR PLAN.

THIRD FLOOR PLAN.

SECOND FLOOR PLAN.

CONGRATULATIONS and best wishes for continued prosperity are due to the East Siberian Section of the Imperial Russian Geographical Society, which celebrated at Irkutsk, on the 17/30 of November, the fiftieth anniversary of its foundation.

JUSTUS PERTHES is now bringing out the ninth edition of Stieler's Hand-Atlas in *lieferungen*, each containing two maps, at intervals of from two to three weeks, at the reduced price of 30 marks (7.50) for the complete atlas of 100 maps.

A full alphabetical index of names will be be for sale, at a moderate price, after the publication of the last *lieferung*,

PROF. EMILE CHAIX, of Geneva, sends a copy of the *Notice sur les Travaux de Paul Chaix*, contributed to *Le Globe*, Tome LX.

The list of Prof. Paul Chaix's principal publications fills eight pages of the *Notice*, which contains also an account, written by him, of the Vaudois valleys of Piedmont, with a hitherto unpublished map, drawn in 1854. Of this the author says:

> I have inscribed in my map the names of 495 towns, villages, and hamlets, of 15 large valleys, of 140 mountains and passes, of 121 streams and brooks, and I have marked, in columns at the sides, the elevation of 119 points, 87 of which are from my own observations. In spite of this show of figures, I cannot hide from myself the fact that the map is still incomplete; but I thought it better to leave blanks to be filled than too many mistakes to be corrected.

M. Emile Chaix's remarks on his father's life and character win the respect and sympathy of his readers.

M. PAUL CHAPPELLIER is the author of a communication to the *Congrès des Langues Vivantes* at the Paris Exposition of 1900 on the subject of the Universal Language; or, as he prefers to call it, the International Language. He will have nothing to do with Volapük or Esperanto, or any other artificial tongue. His proposition is that French or German (whichever is chosen) be made obligatory in the schools of the English-speaking nations, and English obligatory in the schools of France and Germany. This would make the people of these nations familiar with two of the most widely-known languages, and the obvious advantage of ready communication with these nations would lead the people of other countries to adopt one, at least, of the chosen tongues, and the International Language would be established. In no short time, of course; M. Chappellier recognises the fact, and admits the difficulties in the way of an international agreement upon such a subject. He cites, however, the instances of the Universal Postal

Union, the Geneva Cross, and the neutrality of sub-marine cables to show that agreement is not impossible; and he foresees the adoption of the metric system by England and the acceptance of the Greenwich meridian by France.

The cases are hardly analogous. Governments agree that a letter shall be carried for five cents, and the thing is done. Study is a different matter. The teacher may be required by law to give instruction in a language; it does not follow that the scholars will learn what is taught.

The International Language may be added to the number of visionary schemes for the improvement of the world.

THE U. S. BOARD ON GEOGRAPHIC NAMES, at a meeting held December 4, 1901, made the following decisions:

BOWLEMS; creek and mountain, Yancey Co., N. C.
(Not Bolens.)

CASCADE SPRINGS; post village, Fall River Co., S. Dak.
(Not Cascade.)

CHIKASANOXEE; creek, tributary to Tallapoosa river, Chambers Co., Ala.
(Not Chickasonoxie, etc.)

COHOBADIAH; creek, tributary to the Little Tallapoosa, Cleburne and Randolph counties, Ala.
(Not Cohabadia nor Hobadijah.)

CUTNOSE; creek, tributary to the Little Tallapoosa, Randolph Co., Ala.
(Not Cutnoe nor Cut Nose.)

GILLESPIE; creek, Ohio Co., W. Va.
(Not Gillaspies, Glasby nor Glyspie.)

LA PURISIMA CONCEPCION; land grant, Santa Clara Co., Cal.
(Not La Purissima Concepcion.)

NEW WINDSOR; village, P.O. and R.R. station, Weld Co., Col.
(Not Windsor.)

PALOMAR; mountain, in northern part of San Diego Co., Cal.
(Not Smith.)

PIT; river, tributary to the Sacramento river in northern California.
(Not Pitt.)

NOTE: This name, applied as early as 1850, is thus explained in Pacific Railroad Report, Vol. VI, p. 64:

"We passed many pits about six feet deep, and lightly covered with twigs and grass. The river derives its name from these pits, which are dug by the Indians to entrap game. On this account Lt. Williamson always spelled the name with a single t."

PLUM; creek, tributary to Cheyenne river, Fall River Co., S. Dak.
(Not Plumb.)

ROBINS; creek and marsh, Chincoteague bay, Worcester Co., Md.
(Not Robbins, Robin's nor Robin.)

NOTE: This is a reversal of the decision Robin made in May, 1901.

ROBINS; point, the end of Gunpowder neck, Harford Co., Md.
(Not Robbins nor Robin.)

STANSBURY; creek, branch of Middle river, Baltimore Co., Md.
(Not Stansberry.)

STANSBURY; point, Back river, Baltimore Co., Md.
(Not Stansberry.)

VAILSGATE; P.O. and R.R. station, Orange Co., N. Y.
(Not Vailgate nor Vail's Tollgate).

WELSH; P.O. and R.R. station, Chambers Co., Ala.
(Not Welch).

TRANSACTIONS OF THE SOCIETY.

NOVEMBER–DECEMBER, 1901.

A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, November 19, 1901, at 8.30 o'clock P.M.

Vice-President Tiffany in the chair.

The following persons, recommended by the Council, were elected Fellows:

J. Herbert Senter.
Alfred H. Smith.
Henry L. Reynolds.
Howard Willets.
Frederick Van Beuren, Jr.
Rev. Dr. Charles Cuthbert Hall.
Prof. Edward Luther Stevenson, Ph.D.
James H. Hyde.
Emil V. Kohnstamm.
Andrew J. C. Foyé.
Dr. Martha Krug Genthe.
Rev. William E. Todd.
Mrs. Theodorus Bailey Myers.
Mrs. Julian-James.
Charles Stuart Douglas.
Ormond G. Smith.
Charles E. Orvis.
James H. Falconer.
George Watson Cole.
Clinton Gilbert.
Albert Symongton.
Walter Phillips Terry.

The Chairman announced the resignation of the President, laid before the Council on the 14th of November and accepted, in the following correspondence:

GREAT BARRINGTON, Mass., Nov. 8, 1901.

MY DEAR MR. PARISH:

My election to the Mayoralty compels me to concentrate all my attention upon that one duty. I am obliged, therefore, to hand you, herewith, my resignation as President of the Am. Geographical Society, and to ask for its acceptance at an early day.

Regretting to terminate so soon an association that has been so congenial, I am,

Yours sincerely,

(Signed) SETH LOW.

MR. HENRY PARISH,
Chairman Ex. Committee.

THE AMERICAN GEOGRAPHICAL SOCIETY, NEW YORK:

NOVEMBER 15, 1901.

HON. SETH LOW:

DEAR SIR,—

At a meeting of the Council of the American Geographical Society, held Nov. 14th, 1901, your resignation as President of the Society was pre-

sented, and under the circumstances there seemed no alternative but to accept the same, which the Council did, very reluctantly.

Duly appreciating the importance of the high position to which you have been called by the people, it is a source of satisfaction that your connection with this Society is severed only that you may assume an office in which you can render most important service to the community at large.

We beg to tender to you our high regard and esteem and to assure you of our deep interest in the success of your administration as Mayor of this city.

Very truly yours,

(Signed) A. A. RAVEN,
Sec'y pro tem.

The Chairman then introduced the speaker of the evening, Mr. Herbert L. Bridgman, who delivered a lecture on Peary's Progress to the Pole. Among the illustrations thrown upon the screen was Peary's detailed map of the northern coast of Greenland.

On motion, the Society adjourned.

A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West 40th Street, on Tuesday, December 17, 1901, at 8.30 o'clock P.M.

Vice-President Moore in the chair.

The following persons, recommended by the Council, were elected Fellows:

John Flack Winslow. Charles Hoffman, Jr.
Miss Matilda W. Bruce. William Bruce-Brown.

The Chairman then introduced to the Society Capt. J. Slocum, who delivered a lecture entitled Sailing Alone Around the World.

On motion, the Society adjourned.

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